USER MANUAL

MERCURY

Content

QUICK MENU 3
I. INTRODUCTION 5
Principles of CO_2 Laser 5
Safety 5
Precaution 5
Fire Precaution 5
Warning Label 6
Frequently Asked Questions 7
Lens and Manual Focus Gauge 12
Instruction of Rotary Attachment 13
TOP VIEW 14
Operation: 14
SIDE VIEW 15
Dual Head Installation 16
II. RECOMMENDED CONFIGURATION 18
Computer 18
Scanner 18
Software 18
III. HARDWARE INSTALLATION 19
Cabling Connection: 19
Parallel Transmission 19
Serial Transmission 20
Interface for Macintosh 20
Exhaust Ventilation 20
IV. SOFTWARE INSTALLATION 21
Install LaserPro Mercury driver to PC 21
V. OPERATION 21
Environment 21
Flexible Utility of Your Memory Buffer 21
Am I in Multiple File mode or Single File mode now? 22
Start to Operate 23
START/STOP 24
FUNCTION 28
Software Operation 40
VI. BASIC MAINTENANCE 61
Clean the mirror – Please refer to the figure as below 61
Clean the focus lens 63

VII. TROUBLE SHOOTING 64
Quality Problems 64
Non-operational Problems 64
Appendix A. 3D Function 65
Tip for 3D Application 65
APPENDIX B. Application Parameters 67
Engraving Parameter 67
Cutting Parameters 68
APPENDIX C. Specification 69
Optional Items: 69

QUICK MENU

1. Connect air exhaust system.
2. Setup computer and connect with engraving system properly.
3. Turn **ON** host computer system.
4. Install the MERCURY Driver. (for the first time use only)
5. Use Windows-based program (such as CorelDraw, PhotoShop, PhotoPaint, Illustrator, CASmate, Signlab, EasySign, AutoCAD, etc.) to operate with the engraver.
6. Turn **ON** engraver. The lens carriage moves to the home position (upper left corner) and the working table moves down 50mm approximately after system initialization. (If a rotary attachment has been installed, the working table will move down to the bottom.)
7. **Auto-focusing:** under **STOP** status, put work-piece on the table, move X-axis (Please refer to Fig. 3) and carriage by arrow keys to locate the lens carriage above the engraving material (holding carriage by hands for prompt moving is acceptable under **STOP** condition but not recommended). Press **AUTO FOCUS** the table will move upward and stop at the focal positionautomatically.
8. The following is an example by using **CorelDRAW V.11**. Please ready the engraving graphic in CorelDraw, and follow the instruction below to start work.
   1. **Layout**
   2. **Page Setup**
   3. **Set from Printer,** choose **Portrait**
   4. **OK**
   5. Edit desired file (picture etc.)
   5. **File**
   6. **Print**
   7. **Properties**
   8. **Options,** choose **desired Mode** (refer to Fig. 11) then set up proper resolution, power and speed
   9. **OK**
   10. **Print**
   11. **F**ile name is shown on LCD then press **START.**

   (Please refer to page 16, **Start to Operate,** for detail operation in different mode selection)

NOTE:

- If the memory buffer is set up in **Single file / No Repeat** mode, under **START** condition,
  the engraver will start to engrave/cut upon receiving a file. While if the memory buffer is set up in **Multiple File** mode, receiving at least one complete file then press **START** to start a job (refer to page 20, **Start to Operate**).
- Choices of **DPI must be the same** for both editing and printing out a file.
- Turn on the air exhausting system before engraving.
- The **maximum loading weight** of working table is **20 kg**.

NOTICE:

1. In order to match Mercury driver's color. Make sure your **CorelDRAW V.11** or **later** the **"Color Management off**" is disable. Please fallow the steps:
   Tools → **Color Management** → **Color Management Off** → **OK.**

2. When operating with **CorelDRAW V.11** or later version, please choose **Layout** → **Page Setup** → **Set From Printer**.

3. When using the available artworks from the Clipart of CorelDRAW, ***to prevent the hidden vector lines shown on your engravings***. Please do as follows:
   Choose a file from Clipart, go to **Bitmaps** → **Convert to Bitmap,** after converting the file**,** go to **Bitmaps** → **Mode** → **Grayscale** → **OK.**

I. INTRODUCTION

Principles of CO_2 Laser

LASER is a **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation.
A CO_2 laser works by exciting the molecules of a carbon dioxide gas mixture.
To engrave, the beam is focused through a lens. The intensive beam can vaporize the surface of the material leaving an engraved image or, in some cases, cutting through the material.

Safety

Laser engravers that have the CDRH safety rating of Class 1 are required to have key safety features such as an enclosed laser beam and safety interlock mechanisms designed to protect the operator. In addition to the safety features of a Class1 machine, the LaserPro Mercury has been equipped with a red guidance pointer. This red dot allows the operator to safely see the focal point of the laser beam. It also gives Mercury the improved CDRH safety rating of 3R.

Precaution

1. The suitable temperature for working environment is 15℃~30℃ (60℉~86℉). In an appropriate and comfortable working environment, the working efficiency will be much better.
2. Always wear certified safety goggles. Reflective materials such as mirrors, enameled brass and anodized aluminum may reflect a portion of the invisible laser radiation. This may cause sever eye damage if appropriate safety goggles are not worn.

   NOTE: Each LaserPro laser machine is equipped with a safety goggle, if you need another one, please contact LaserPro for it or try to get one that meets the following specification.

   190-398 nm OD5+
   10,600 nm OD5+
   Visible light transmission: 92.9%

3. Do not attempt to modify or disassemble the laser system at any time.
4. Wear appropriate safety goggles especially when engraving with mirrors or coated metals such as enameled brass and anodized aluminum..
5. Good ventilation is required to remove odors and vaporized materials to the outside of the building or structure. An exhausted system is recommended.
6. Do not work with reflective metals, heat sensitive surfaces or other materials that may produce toxic substances, such as PVC and Teflon.
7. A fire extinguisher should be available on hand at any time.
8. Never leave the machine unattended during operation.
9. Follow the recommendations for maintaining and cleaning your system. Not only will this enable you to engrave efficiently, it will ensure that your machine runs safely as well.

Fire Precaution

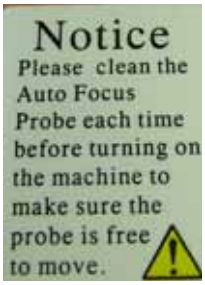
1. When cutting materials that easily caught on fire, such as acrylic, wood or paper, it is advised to have air compressor turned on to prevent flame.
2. If cutting table, or honey comb table, is used for cutting purpose, do not leave any material underneath, as when material at top is cut through, the material at below will be burned easily due to trapped heat.

3. It is not encouraged leaving the cutting job unattended, especially with materials mentioned above.

The Safety Interlock System

The LaserPro EXPLORER is complete with a safety interlock system that automatically shuts off the power supply to the laser whenever the top or front door is opened. There are magnets on the top and front door, which activate this safety mechanism. Do not attempt to remove or modify these magnets or any other component of the safety interlock system.

Warning Label



On the surface of Carriage

DANGER
INVISIBLE LASER RADITION WHEN OPEN AND INTERLOCK FAILED OR DEFEATED AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADITION

On the front cover of Laser Tube

On the front center of the top door

On the backside of the machine

WARNING
Invisible laser radiation when door open and interlock failed .
Avoid eye or skin exposure direct to laser radiation.
Please wear goggle to operate while door open.
Do not leave the machine unattended during operation.
Please clean the bearings and motion system tracks everyday.
Do not use reflective metals, heat sensitive surfaces or materials that may produce toxic substances or corrosion problems, such as PVC and Teflon.

On the upper left side of the machine

Frequently Asked Questions

1.What materials can be processed by CO_2 laser?

Virtually any materials such as acrylic, wood, fabrics, glass, leather, marble, stone, rubber stamps, paper products, coated metals, plastics (especially micro plastic developed by IPI, Spectrum and Rowmark etc.) other hard-surface materials blended with polyester and fibers (Corian™, Fountainhead™, and Avonite™ etc.) or laserable simulated products of stone, wood and metal etc.

Bare metals can not get a good engraving result by using CO_2 laser. However, ***special kind of spray*** has been developed that allows CO_2 laser to mark on the bare metals such as stainless steel, aluminum etc. Do not engrave or cut materials which are heat sensitive or toxic substances can be produced ***(e.g. PVC and Teflon coating)***.

2.What is the life cycle of the laser source?

The life cycle of laser source is around 20,000 hours, however it can be re-filled and should be done by your dealer.

3.What is the main purpose of air assist system?

The air assist system can provide a much better engraving & cutting effect, as it will blow away vaporized particles and prevent fire due to overheating.

4.What does cutting table do?

The cutting table, also known as honeycomb table, is especially useful for vector cutting application. The space between materials and working table, gapped by cutting table, allows heat and smoke to be disbursed and vented out which may otherwise cause bad cutting effect.

5.What is the maximum engraving speed of LaserPro Mercury?

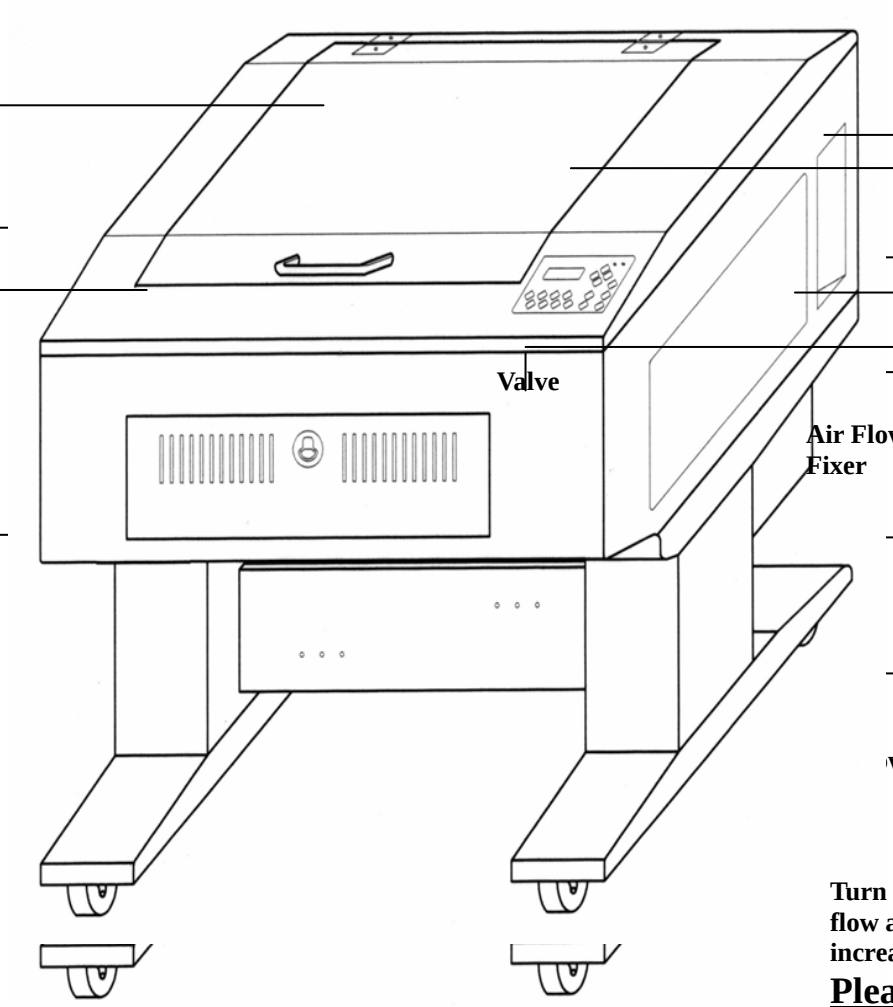
The maximum engraving speed of LasePro Mercury is 1066 mm/sec (42 inch/sec). When engraving an A4 (18 x 28 cm) size square with 250dpi at full speed, it takes LaserPro Mercury about 18 minutes to complete.

6.How to engrave an extremely long working piece?

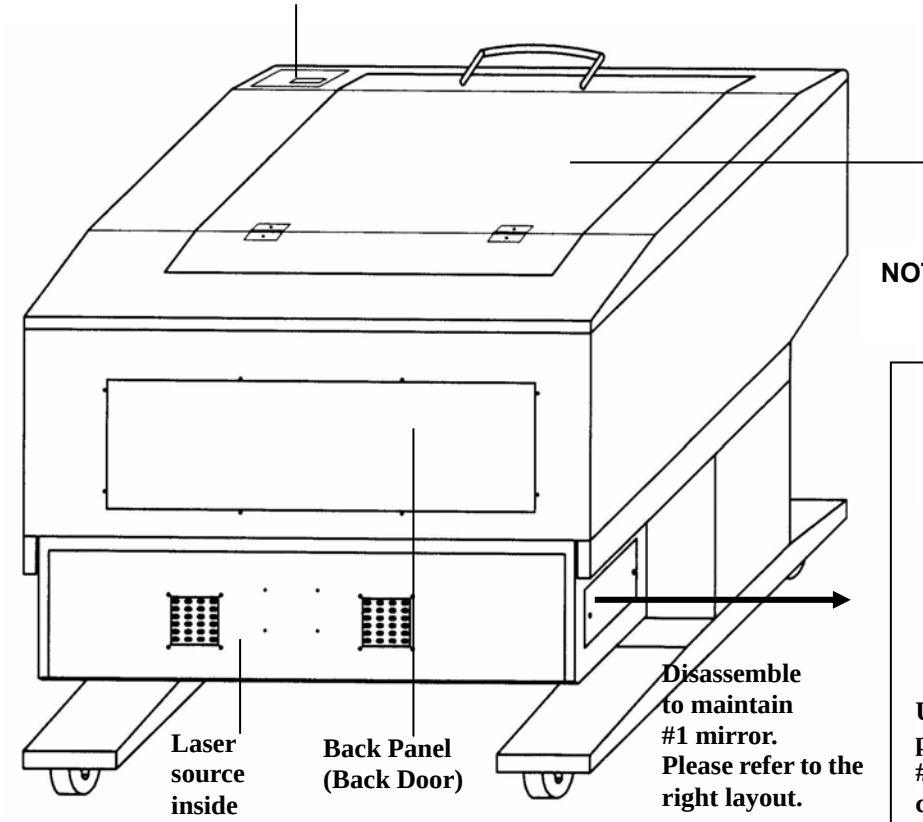
The back door (or panel) of LaserPro Mercury can be removed by taking away the

screws. For a better ventilation and safe purpose, this special design is to prevent the back door being opened without notice during operating. However, you have to use magnetic devices to short the connector of the magnetic switches on both side of the front door while opening for engraving extremely long work-piece. When doing so, make sure that you wear safety goggles to operate the machine.

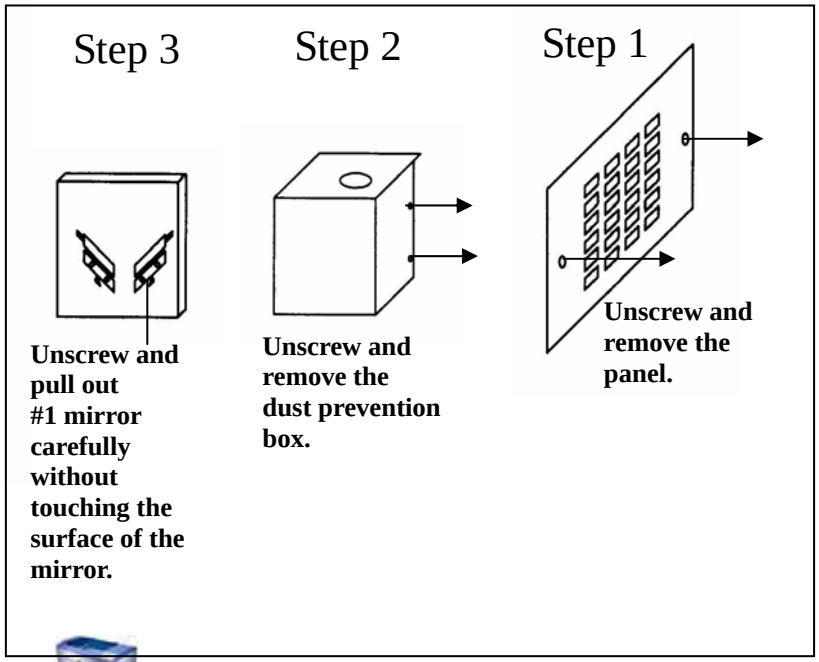
Front View


Top Door
Top Door
Front
Door
Front
Switches & Ports
Control Panel
Valve
Air Flow
Fixer
Press the ring to pull
out the air tube.
Air inlet connect
to air compressor
Press the ring to pull
out the air tube.
Air inlet connect
to air compressor
Turn clockwise to decrease the air
flow and counterclockwise to
increase the air flow.
Please avoid turn off.

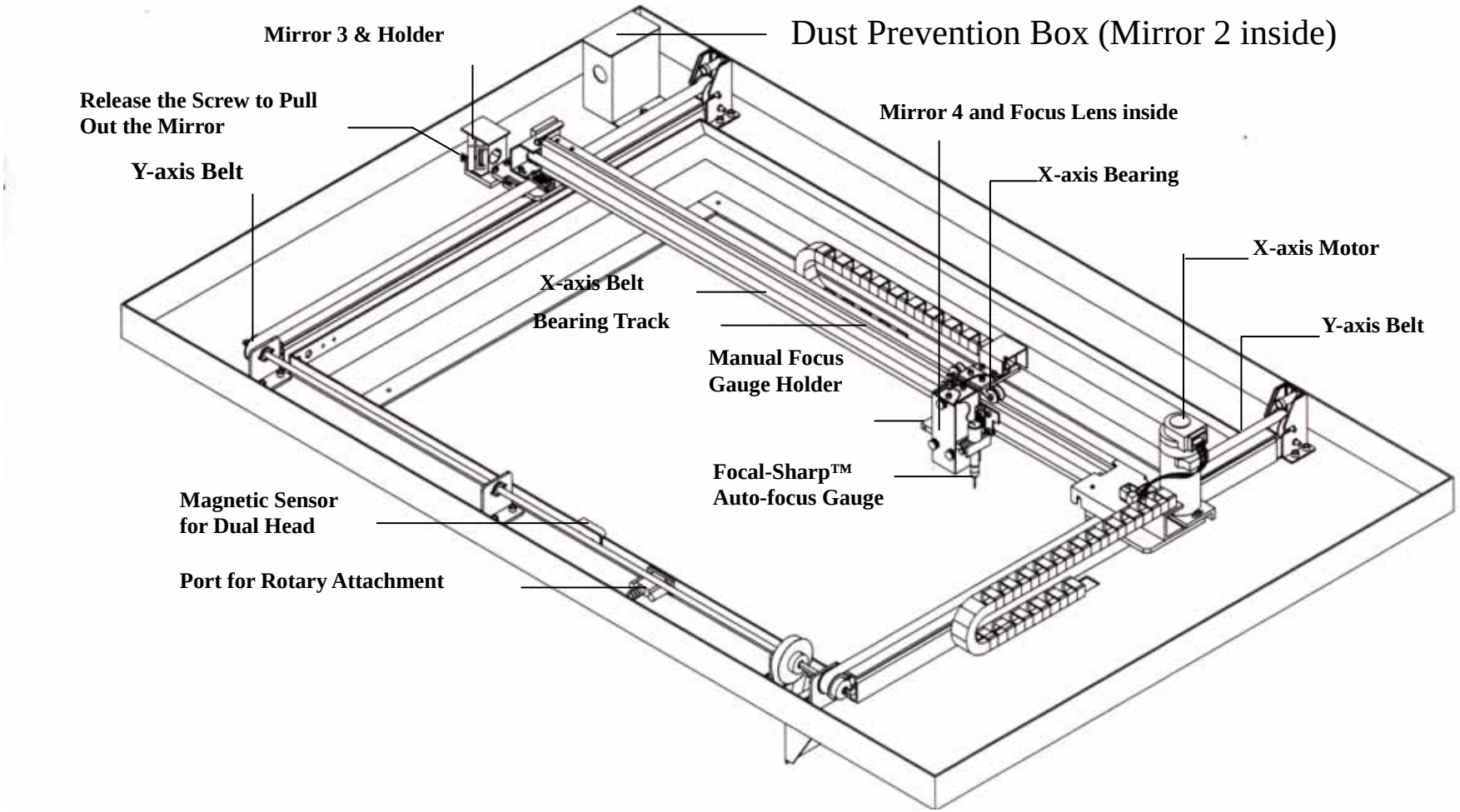
Back View



NOTE: ***Please refer to Fig. 25 and follow the instruction for the basic maintenance of mirror.***

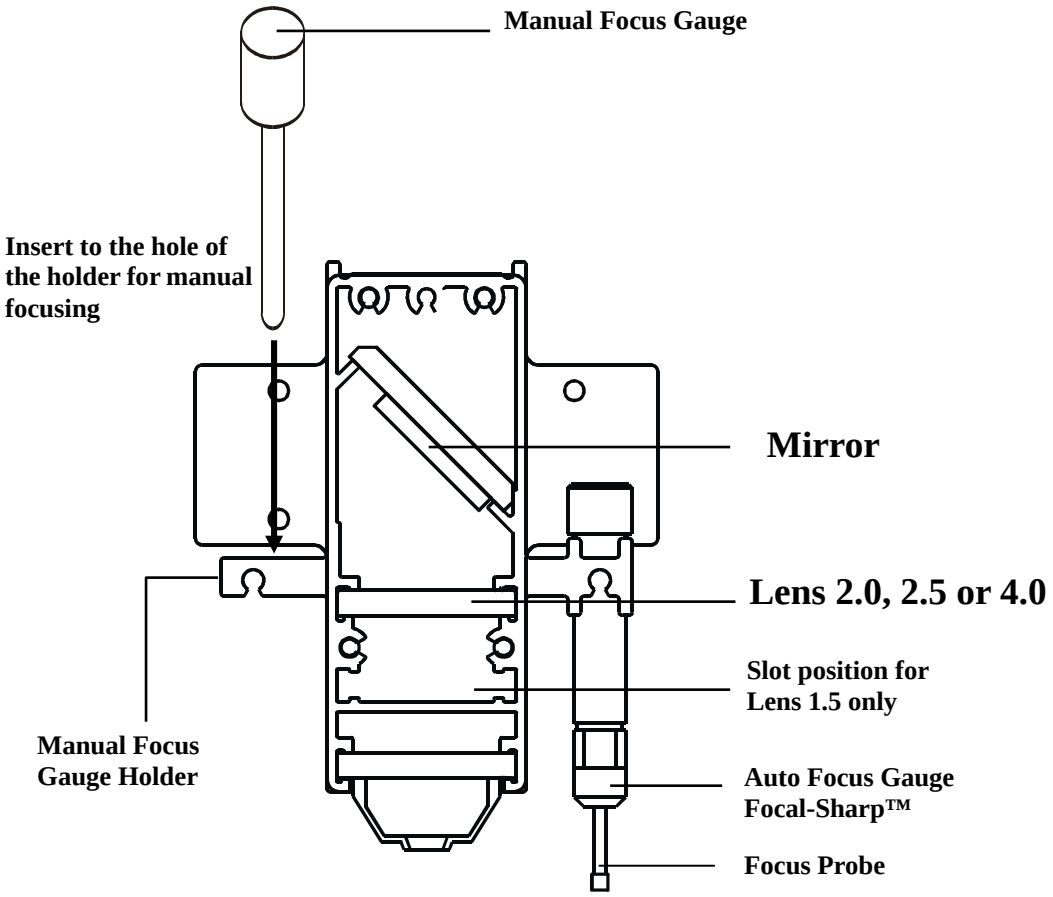

Step 3
Step 2
Step 1
Unscrew and pull out #1 mirror carefully without touching the surface of the mirror.
Unscrew and remove the dust prevention box.
Unscrew and remove the panel.

Motion System


Mirror 3 & Holder
Dust Prevention Box (Mirror 2 inside)
Release the Screw to Pull Out the Mirror
Mirror 4 and Focus Lens inside
Y-axis Belt
X-axis Bearing
X-axis Motor
X-axis Belt
Bearing Track
Y-axis Belt
Manual Focus Gauge Holder
Focal-Sharp™ Auto-focus Gauge
Magnetic Sensor for Dual Head
Port for Rotary Attachment

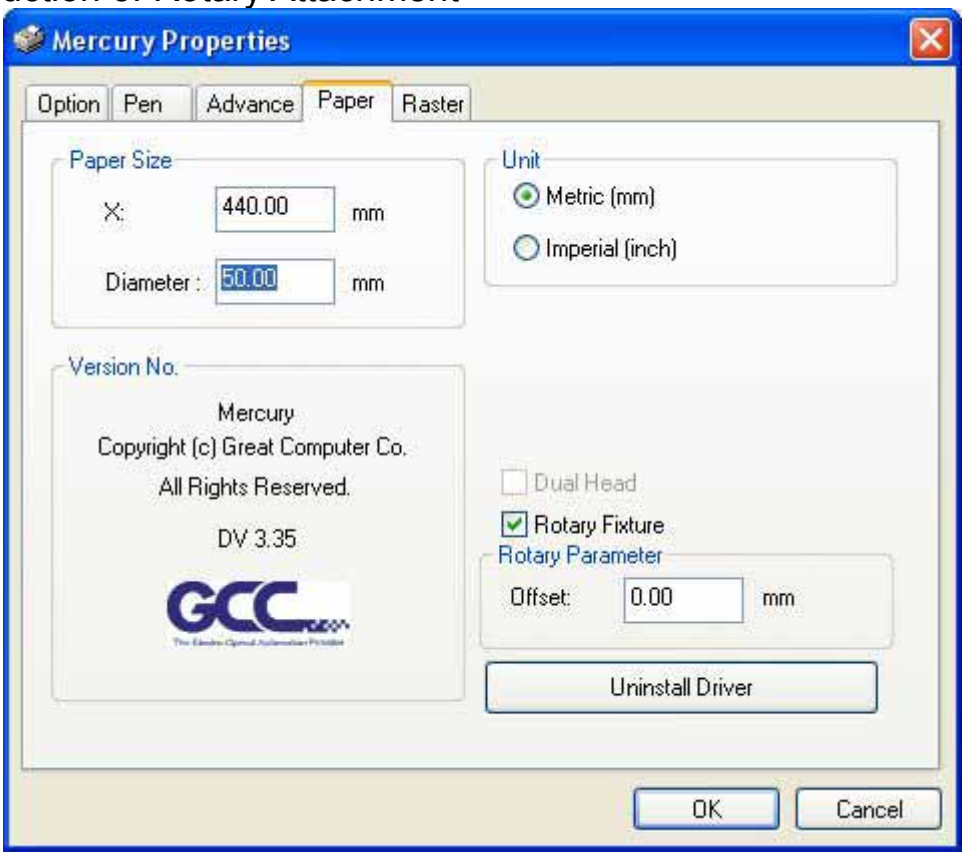
Lens and Manual Focus Gauge

Focal Length		Matched Color	
		LENS	MANUAL FOCUS GAUGE
1.5”	Option	Purple	Blue (same as 2.0”)
2.0”	Standard	Blue	Blue
2.5”	Option	Gold	Gold
4.0”	Option	Red	Red


Manual Focus Gauge
Insert to the hole of the holder for manual focusing
Mirror
Lens 2.0, 2.5 or 4.0
Slot position for Lens 1.5 only
Manual Focus Gauge Holder
Auto Focus Gauge Focal-Sharp™
Focus Probe

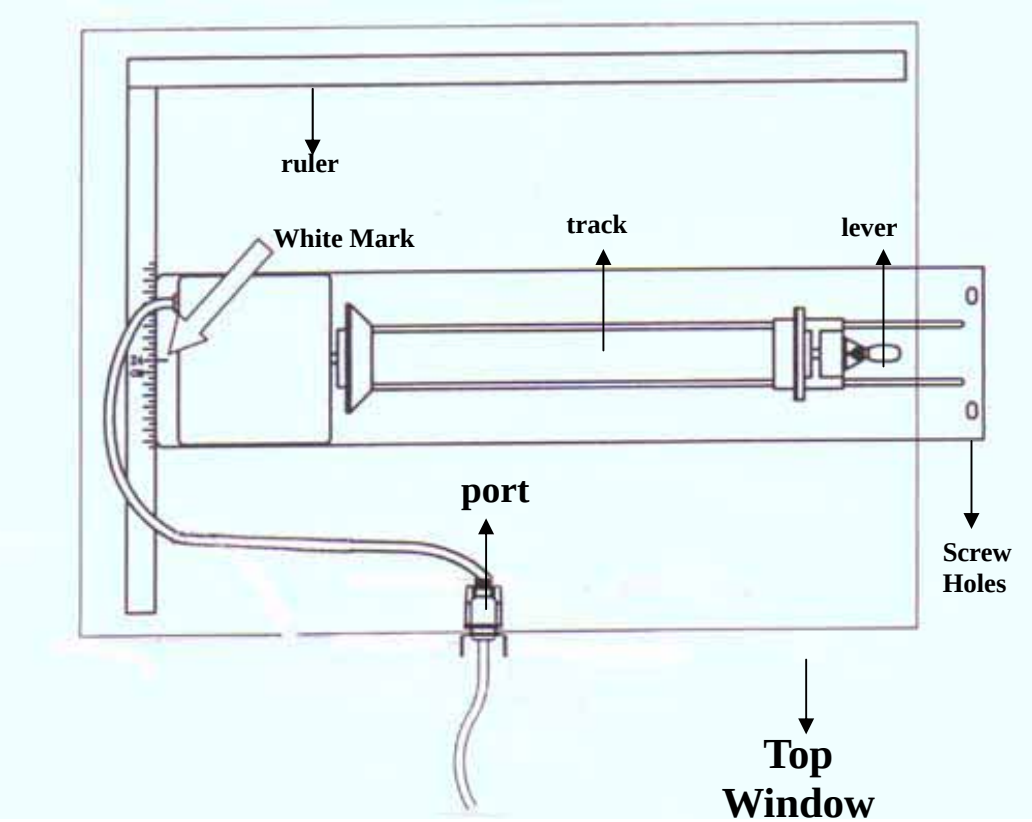
Focus Carriage Assembly

Instruction of Rotary Attachment



1) Turn off the power of the engraver.
2) Put the rotary attachment onto the engraving table. Ensure the two screw holes should match the two corresponding holes on the table and the white mark of the left side align to the position of 24cm (9.45 inch) on the ruler, then tighten the screws.
3) Plug the cable of the rotary attachment into the port in the middle front of the engraver.
4) Turn on the power and the engraving table moves down to the lowest position automatically.

TOP VIEW

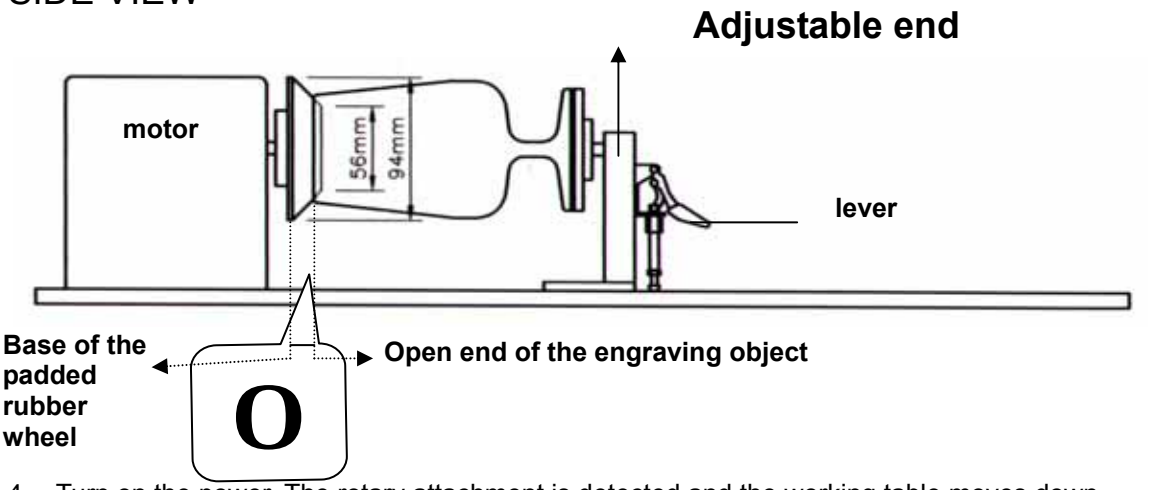


Operation:

NOTE: The maximum length of the engraving object is 450 mm (17.71 inch). The maximum diameter of the padded rubber wheel is 94 mm. To get an accurate engraving position during rotating, it is better that the diameter of the engraving object is not smaller than 90mm (3.54 inch). However, the maximum diameter of the loaded object is 180mm and the limited loading weight is 7 Kg (15.4 Lb.).

1. Measure the diameter of the engraving area for setting up the software operation (refer to Software Operation, Fig.20) before engraving.
2. Lift the lever, loading the engraving object, slide the adjustable end to the bottom of the object firmly, then lower the lever of the fixture to secure it in place shown as in Fig II.
3. If the engraved object is too small, please use 4-inch lens to prevent collision between carriage and rotary attachment devise.

SIDE VIEW



4. Turn on the power. The rotary attachment is detected and the working table moves down to the bottom automatically. The system initializes to the home position, at the same time.
5. Set up focus.
6. The following is an example of engraving process by using **CorelDRAW V.11** or after version
   a. **File**
   b. **Print Setup,** choose **MERCURY**
   c. **Properties**
   d. **Paper,** select **Rotary Fixture**
   e. key in **Offset** value, **X** value and **Diameter** value
   f. **OK**

NOTICE:
When doing the Print Setup under print driver setting, please always choose **Layout → Page Setup → Set From Printer,** no matter operating with CorelDraw V.11, or after version.

NOTICE:
Please always choose **Portrait** for **Page Setup** on CorelDraw V.11 no matter X or Y value whichever is lager.
Layout → Page Setup → Set From Printer → Portrait

Define engraving location by moving the arrow keys and the red point will show the right position you want. Moving the red point from rotary home position (at the base of the padded rubber wheel) to the open end of the engraving object, the **Offset value** (refer to Fig. II & Software Operation, Fig.20) will be displayed on LCD.

Caution:
- Adjust the working table and set up the focus **under STOP status**.
- **Set up focus after initializing** the system to prevent the carriage hit the engraving object.

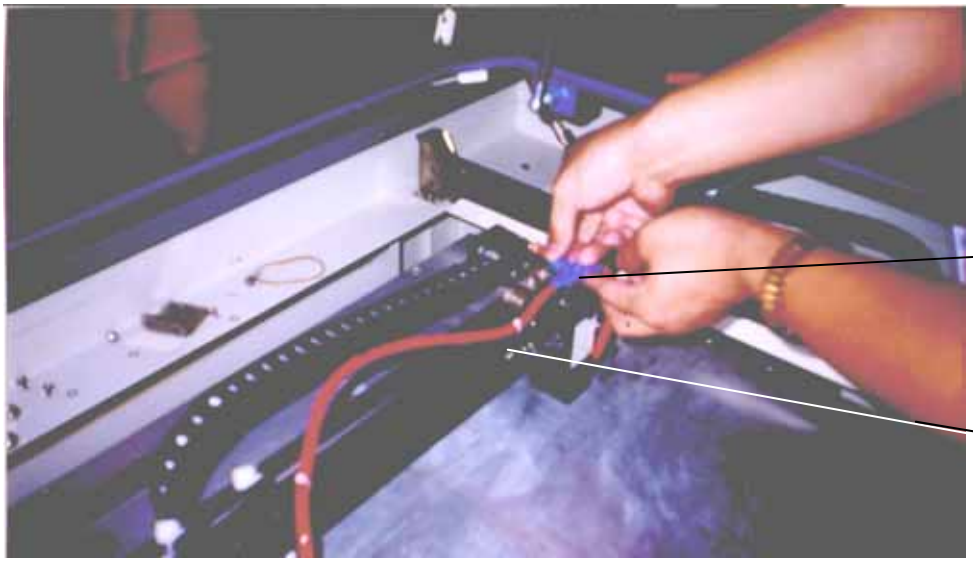
Dual Head Installation

Step 1：Turn off the system.

Step2：Put the dual head carriage onto the X-axis belt bearing track.

Step3：Cut 25mm (1 inch) off the air assist tube on the original lens carriage.

Step4：Connect the air assist tube of the dual head with that of original carriage by “T” connector.

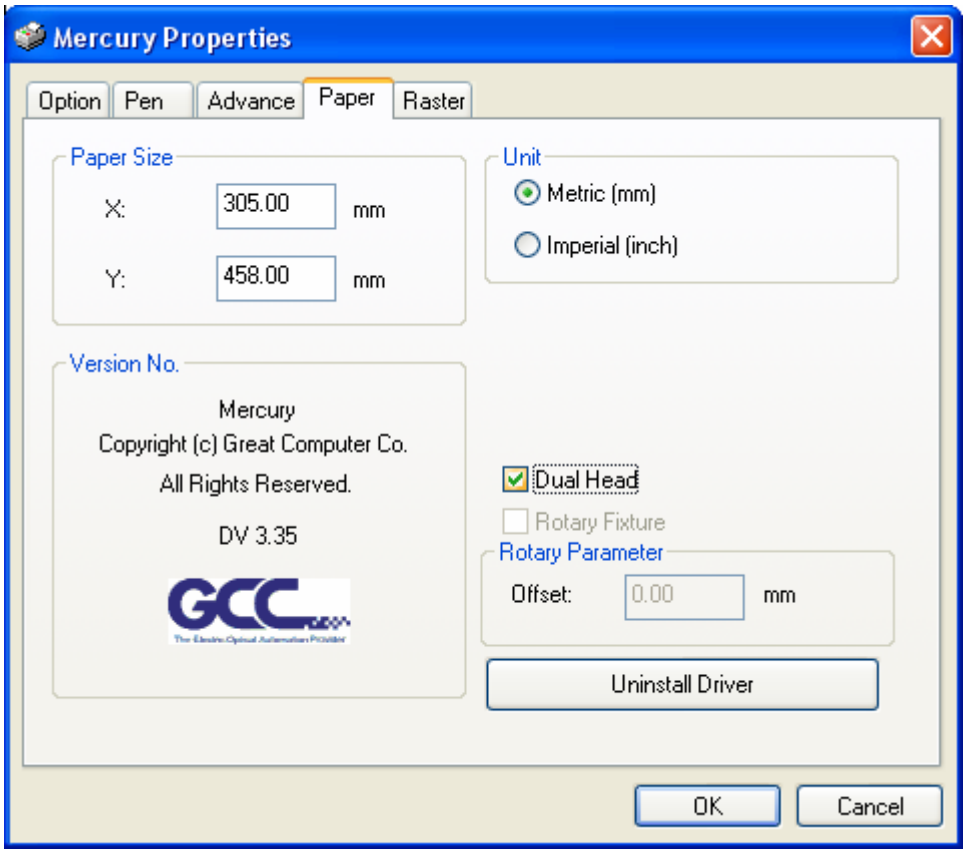


Step5：Screw the metal frame which is attached to the right side of dual head to the original lens carriage.

Step6：Turn on the power to test whether the dual head is installed properly. During initiation, the system will detect the dual head carriage when it moves the lens carriage to front-right side, so it would not crash the dual head carriage when move the origin position.

Note：

1. Keep the screws on the lens carriage after taking off the dual head.
2. Put the black cap on the “T” connector after taking off the dual head to prevent air flowing leaking.
3. Please choose dual head item from Paper option of printer properties before outputting a graph with dual head carriage.



II. RECOMMENDED CONFIGURATION

Computer

Your PC must be sufficient to equip with Window 95 at least.
We recommend the specification of PC for better work as following.

CPU	Pentium at least
DRAM	32 MB RAM or up
FDD	One 3.5" 1.44 MB floppy
HDD	1.2 GB Hard Drive or up
SVGA	15" Super VGA Monitor

★★On Board Parallel Mode(Setup from PC BIOS):
SPP—Preferred Mode
ECP—Cable length less than 1.8meters

Scanner

Flat Bed
Minimum resolution: 200 DPI

Software

GCC driver (designed under Window 95 or higher level)

Windows	Window 95 or higher
CorelDRAW	Version 7.0 or higher version

Any program that can output HPGL commands

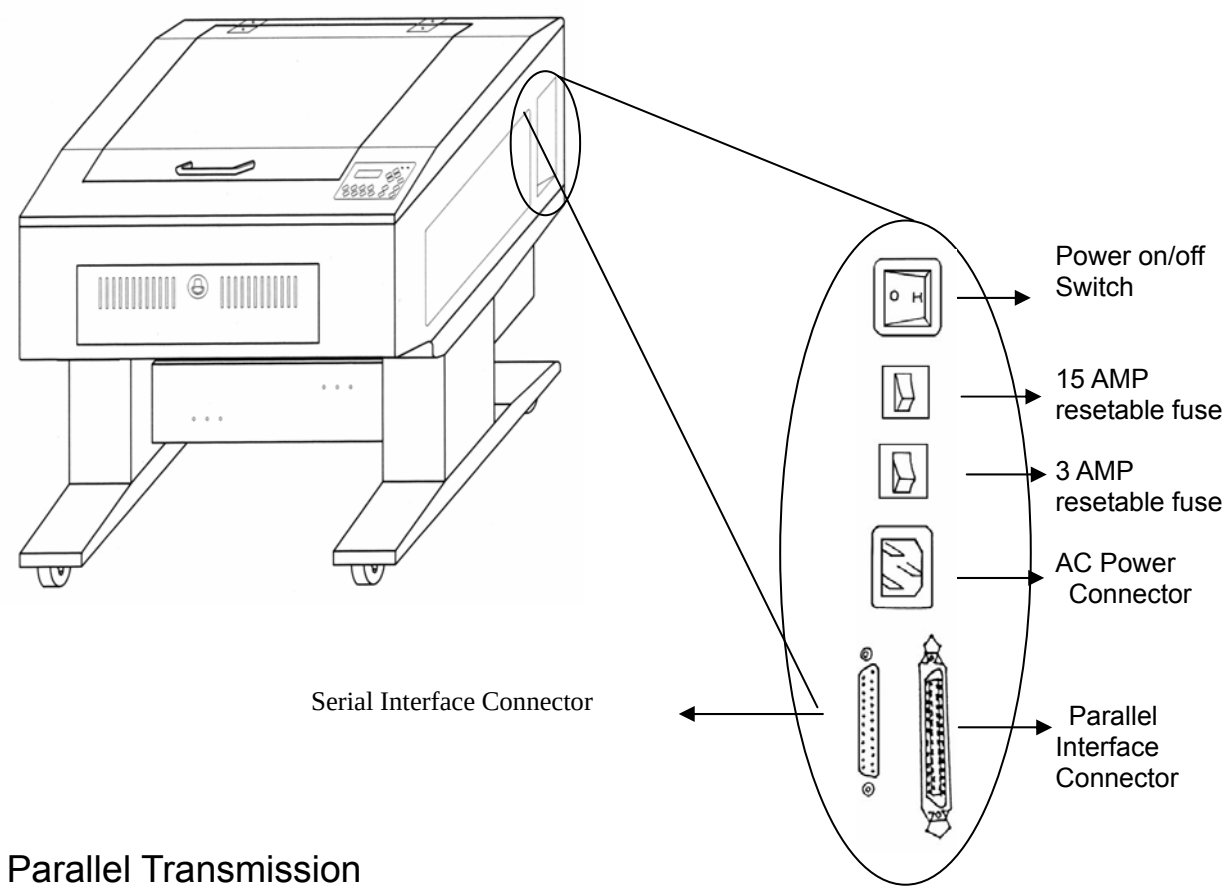
III. HARDWARE INSTALLATION

Caution:

- Turn all equipment off before making any connection.
- Check the plug of the power cord to see if it matches the wall outlet. If not, please contact your dealer.

Cabling Connection:

1. Insert the power cord (male) into a grounded power outlet.
2. Plug the other end (female) into the engraver. The engraver has been design to switch from 100 ~ 240 VAC automatically (100W engraver has to use 220~240 VAC only).
3. The engraver can communicate with a computer through either a serial (RS-232C) or a parallel port (Centronics).



Parallel Transmission

Connect a parallel cable to the engraver (parallel port) then to the parallel port of the host computer.

Caution:

Never use a mechanical switch box when a second printer port is required.
The electrical surges can cause damage to the computer and the engraver.

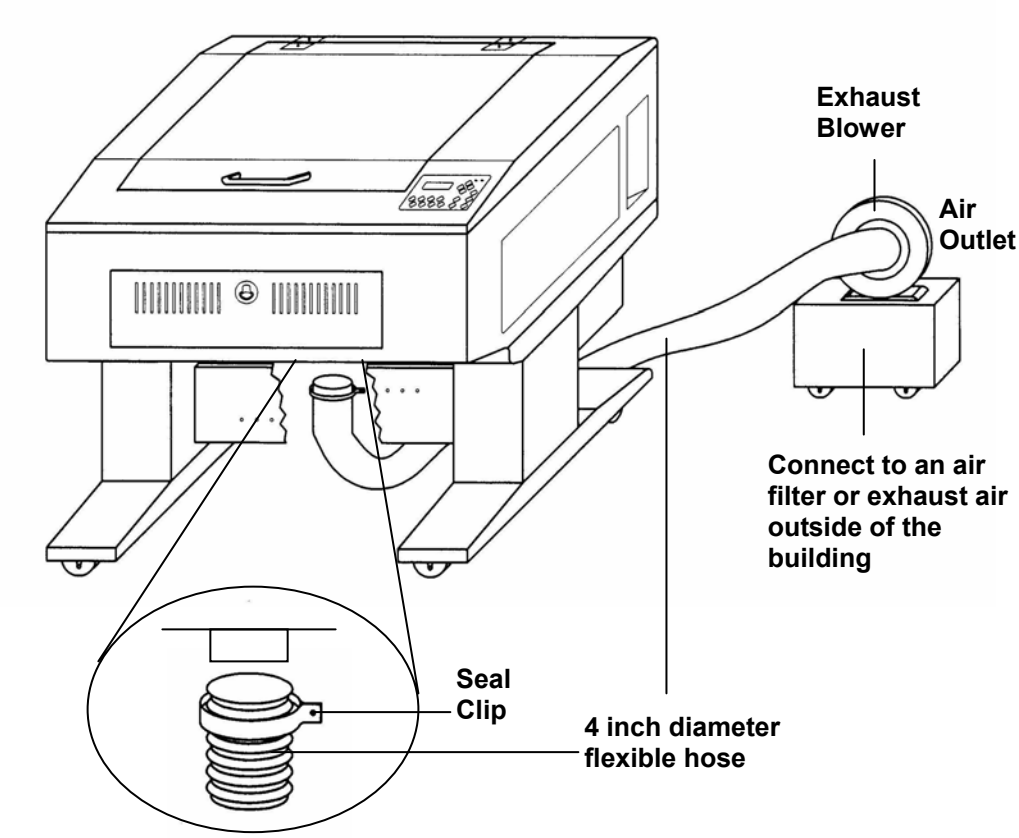
Serial Transmission

If you are using IBM PC, PS/2 or their compatibles, connect the supplied RS-232C cable to the engraver (serial port) then to the serial port of the host computer.

Interface for Macintosh

To operate the engraver with a Macintosh computer (e.g. Power Mac), you need a MAC modem cable (DIN8 to DB25) as an adaptor to connect to the RS-232C cable.

Exhaust Ventilation


Exhaust Blower
Air Outlet
Connect to an air filter or exhaust air outside of the building
Seal Clip
4 inch diameter flexible hose

IV. SOFTWARE INSTALLATION

Install LaserPro Mercury driver to PC. Please follow the procedure below:

1. Choose **Settings** and click **Printers**
2. Double click **Add printer** and start **Add printer wizard.** Then **Next step.**
3. Choose **Local** and click **Next step**
4. Choose **Have disk** and click **Next step**
5. Insert the **Mercury Driver** disk properly into the floppy drive then click **OK**
6. choose the port where your laser system is connected and click **Next step**
7. Name your system or bypass
8. choose the driver to be default printer
9. select **No** when asked to print a test page and click **Finish**

Now the LaserPro Mercury printer driver is installed completely. Don't forget to take the GCC driver disk from the floppy drive and store in a safe place.

V. OPERATION

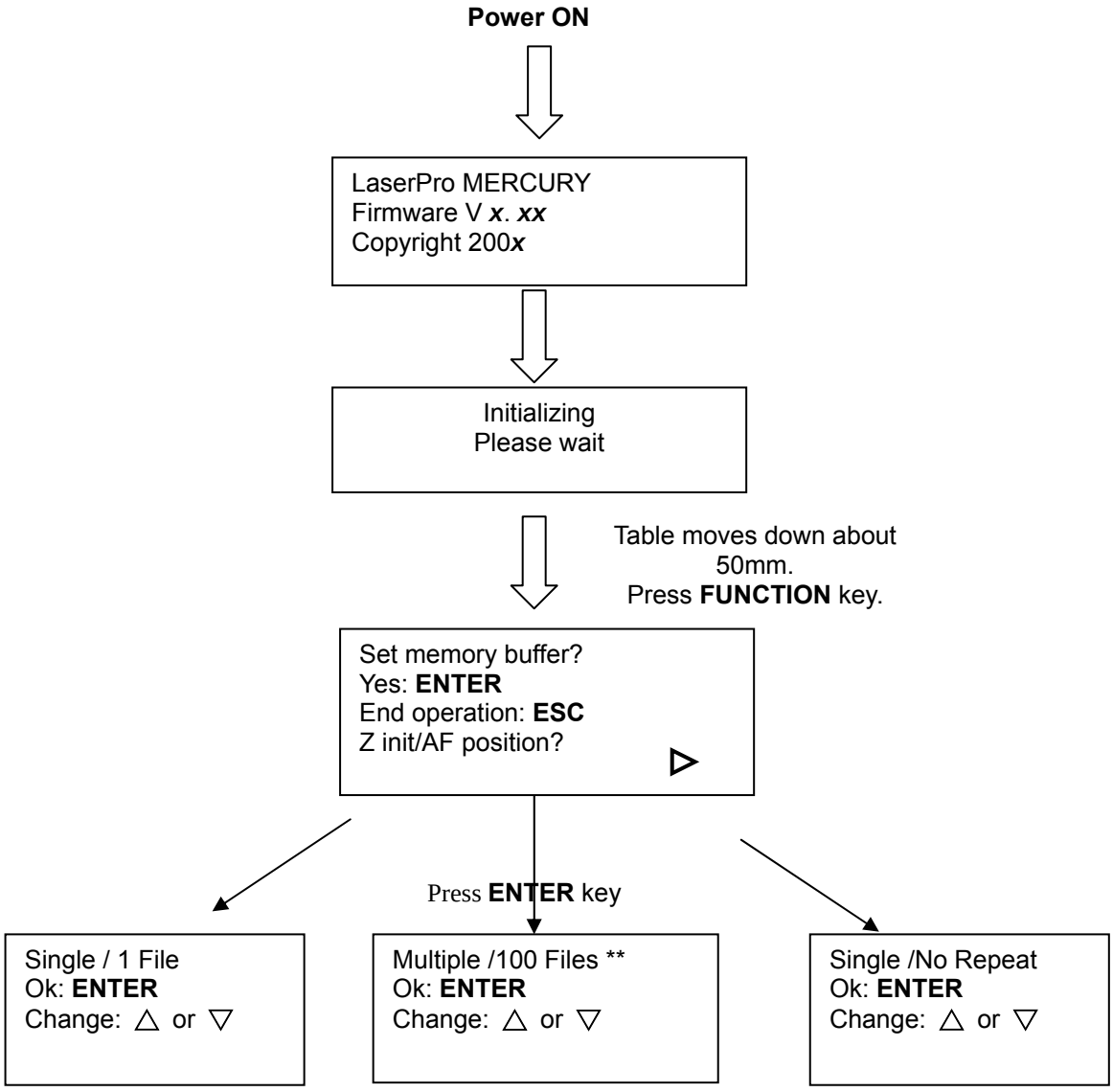
Environment

- A clean, well-ventilated room with a temperature of 15℃~ 25℃ (60℉~78℉) (Strongly suggested the temperature of 25℃) and a relative humidity between 30% and 40%, as an office type environment.
- Avoid from unstable voltage supply.
- Short path for an effective air exhaust.
- Have a fire extinguisher available at any time.

Flexible Utility of Your Memory Buffer

The standard memory buffer size of Mercury is 16M and can be expanded to 64M (32M SIMM x 2).
You can choose **Multiple file** mode with limited memory to save files and re-call them for constant applications. Or, you can choose **Single file** mode to get an unlimited data output while still keep files that you saved before under multiple file conditions. However, the file sent under **Single file** mode will not be saved. In other words, every time you want to engrave this file, you have to re-send again from the host computer.

Am I in Multiple File mode or Single File mode now?



NOTE:

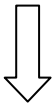
1. ** means default or current setting.

2. AUTO FOCUS and all other function keys should be operated under **STOP** condition.

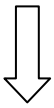
3. NEXT FILE and DELETE keys are invalid under Single file mode.

Start to Operate

Power **ON**

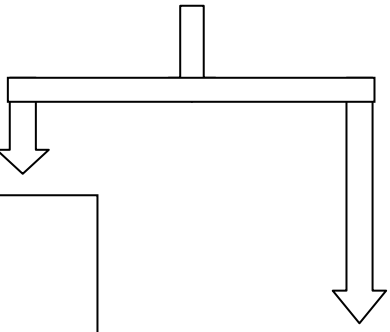


LaserPro MERCURY
Firmware V ***x. xx***
Copyright 200***x***



Initializing
Please wait

Table moves down about 50mm automatically



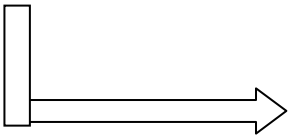
Single file status
Under **START**condition
Upon the receipt of files, start to engrave/cut

Multiple file status

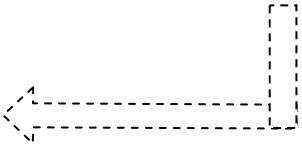
Under **STOP** condition

File:
Speed: %
Power: %
DPI: Copies

Press **START/STOP**, turn to **STOP** condition

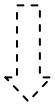


File:
Speed: % 00:00
Power: % STOP
DPI:



Send a new file from host computer then press **NEXT FILE** to show the file name on LCD.

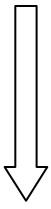
.



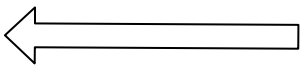
Press **NEXT FILE** to get a desired file

Press **FUNCTION** key for further setting selection

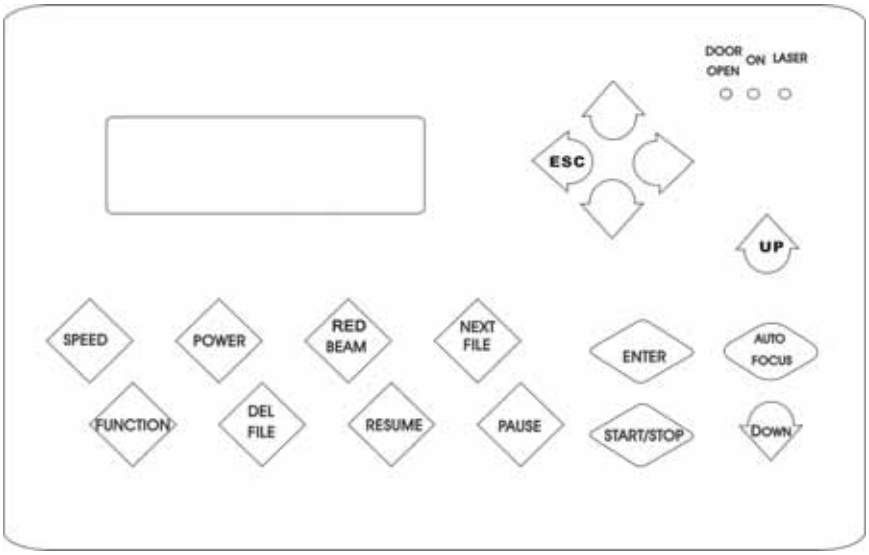
File: # ***x*** ***file name***
Speed: ***xx.x*** % 00:00
Power: ***xx*** % PPI: ***xxxx***
DPI: ***xxx*** ***xxx* K**



Press **START/STOP** to engrave/cut



File: # ***x*** ***file name***
Speed: ***xx.x*** % 00:00
Power: ***xx*** % PPI: ***xxxx***
DPI: ***xxx*** ***xxx* K**



START/STOP

- **Single File Mode:**

Turn on power, MERCURY is under START condition and ready to receive a file. LCD shows as follows:

```
File:
Speed:          %
Power:      %
DPI:            Copies   1
```

Upon the receipt of a file, MERCURY starts to engrave/cut immediately. When a job is done, LCD will show the working time such as 01:10 means 1minute and 10 seconds.

```
File:      file name
Speed: xx     %      01:10
Power: xx     %      STOP
DPI: xxx
```

Press **START/STOP** key, turn the engraver to **STOP** condition. LCD shows as follows. Under **STOP** condition AUTO FOCUS and all other function keys can be operated while NEXT FILE and DELETE keys are invalid under Single file mode.

```
File:      file name
Speed:          %    00:00
Power:      %       STOP
DPI:
```

- **Multiple File Mode:**

Turn on power, Mercury is under **STOP** condition and all function keys can be operated. Laser engraver is ready to receive a file. LCD shows as follows.

```
File:
Speed:          %    00:00
Power:      %       STOP
DPI:
```

Upon the receipt of a complete file, LCD will show the following message for instance. Then press **START/STOP** key, the engraver starts engraving or cutting.

File: # 1 file name Speed: 70 % 00:00 Power: 40 % PPI: ***xxxx*** DPI: 500

If there is no file having been sent, the message will display as follows.

Wait until at least one complete file is received, then press START to start a job

NOTE: Please refer to the flow chart of **"Start to Operate"**, page 16 .

ENTER
Accept and store the selection for setting up.

AUTO FOCUS
This key can only be operated under **STOP** condition. Press this key will move up the working table until the engraving object touches the tip of the focus tool, then the table will move down and stop in focus automatically.

Whenever you change a lens with different focal length, press Function key and go through the process of "**Select lens**" . After changing the lens, press **AUTO FOCUS** key to save the new focal length in memory. LCD will show as follows:

Focusing Then do setup or send a file to start a job 0.0 mm

NOTE:
1. "0.0 mm" means the focus position is the Z-axis home position of the Working table. Above this position the value is negative while below this position the value is positive.
2. Whenever the motion system or working table has ever been adjusted by a technical person, please press **AUTO FOCUS** key to get an initial position before going through the function of "Tuning" (Auto focusing) to change the focal length.

NOTICE:
To stop the motion of auto focus, please press either **UP** or **DOWN** arrow key. If you press the key ***continuously***, working table will move up or down correspondingly.

Arrow Keys
Move cursor on the display for selection or adjust the working table on Z position by pressing the arrow keys of **UP** and **DOWN**.

NOTE:

UP key – After initializing, press this key will move up the table. LCD displays:

Focusing Then do setup or send a file to start a job —***X.X*** mm

During working time (i.e. Start condition), this message won't be shown.
When* Auto Focus *is under process, press* UP *key will stop the motion of Auto Focus and change to up movement.
DOWN key – Same as above function but the motion direction is opposite.

ESC (Escape)
Exit and back to the main menu.

NEXT FILE
This key is valid under **Multiple file** mode only. Press this key the LCD shows

File: # ***x*** ***file name*** Speed: ***xx*** % 00:00 Power: ***xx*** % PPI: ***xxxx*** DPI: ***xxx*** ***xxxxx*** k

The "**k**" message shows on the lower right corner expresses the k bytes memory that has been left over in the buffer.
PPI means pulse per inch.
File: # shows the current working file number. Press **NEXT FILE** each time will increase 1 (i.e. 1, 2, 3…100) and recycle the counting. Once the buffer has received up to 100 files, the LCD shows:

More than 100 files are not allowed Please delete files then other files

If a file received is out of memory, the LCD shows

Not a complete file due to out of memory. Please delete some and send again

RED BEAM
On/Off red beam

SPEED
Set up laser speed for desired effect. When working without using MERCURY's driver, lower case press **FUNCTION** key then select one of the sixteen setups then set up desired cutting speed. No matter you are using MERCURY's driver or not, you can change speed on the fly by

pressing **PAUSE** key prior to change speed during cutting or engraving. Set up desired speed, press **ENTER** then press **RESUME** to continue the job.

POWER
Set up laser power for desired depth and effect. Other conditions are same as stated in SPEED.

PAUSE
Temporarily stop the job during cutting or engraving.

RESUME
Continue the temporarily stopped job.

DEL FILE
This key (delete file) is valid under Multiple file mode only.

Delete current file? Sure: press again No: **ESC**

Press DEL FILE again to delete the file and LCD shows

Now deleting current file. Please wait

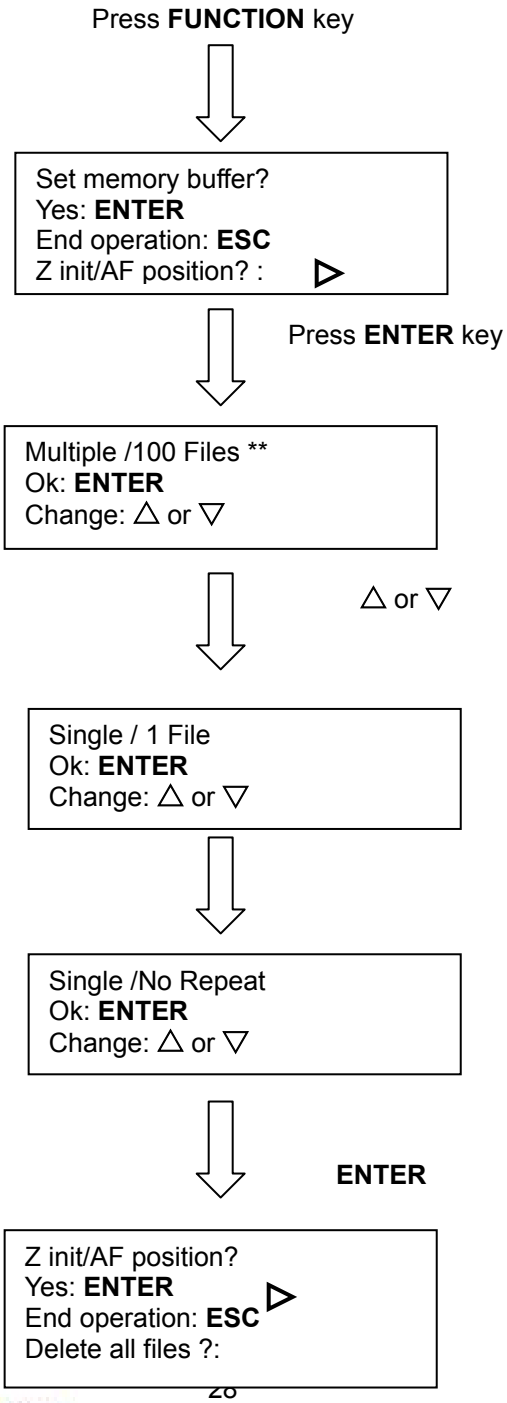
FUNCTION

- **Set memory buffer?**

Setting memory buffer in Single file mode when working with a large data file, or Multiple file mode (up to 100 files) that can be saved for constant engraving.

Under Single file mode, you can only output one job a time. Unlimited data can be transferred without saving in the buffer therefore once you want to repeat the job you have to re-send the file from the host computer.

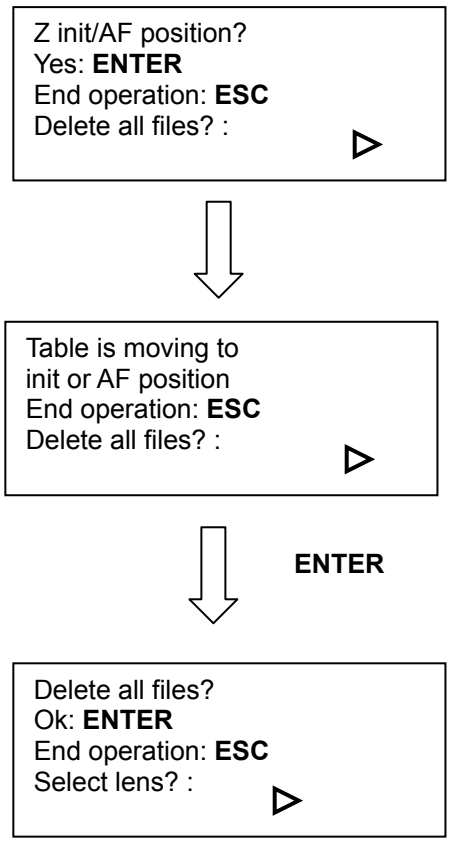
Under Multiple file mode, you can engrave one job while transfer and design the next simultaneously until reaching 100 files' limit, or memory is used up.



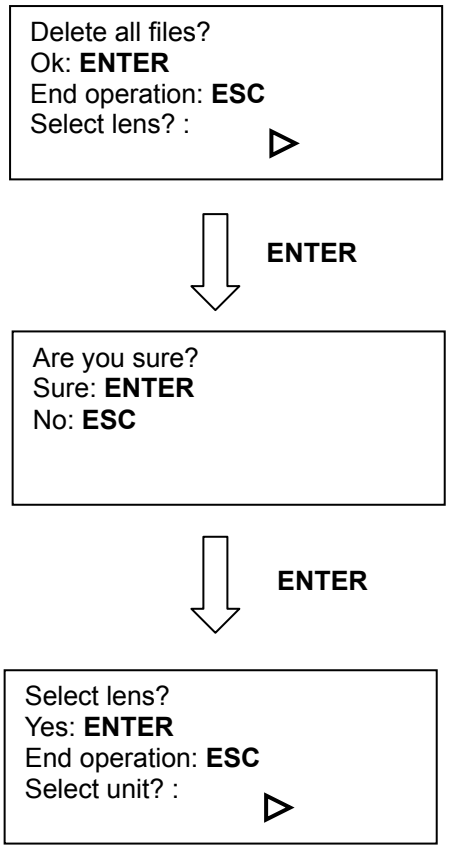
- **Z init/AF position?**

To avoid focus carriage hitting the engraving object accidentally during initializing, working table will move down about 50mm automatically after power on the equipment. Whereas, if a rotary attachment has been installed, the working table will move down to the bottom of the engraver.

After initializing as long as you have not pressed **AUTO FOCUS** key, you can go into this function and move the working table back to the power on position. Once the **AUTO FOCUS** key has been used, the last auto focus position has been saved in the memory. Therefore, the table will move to the last auto focus position by using this function.



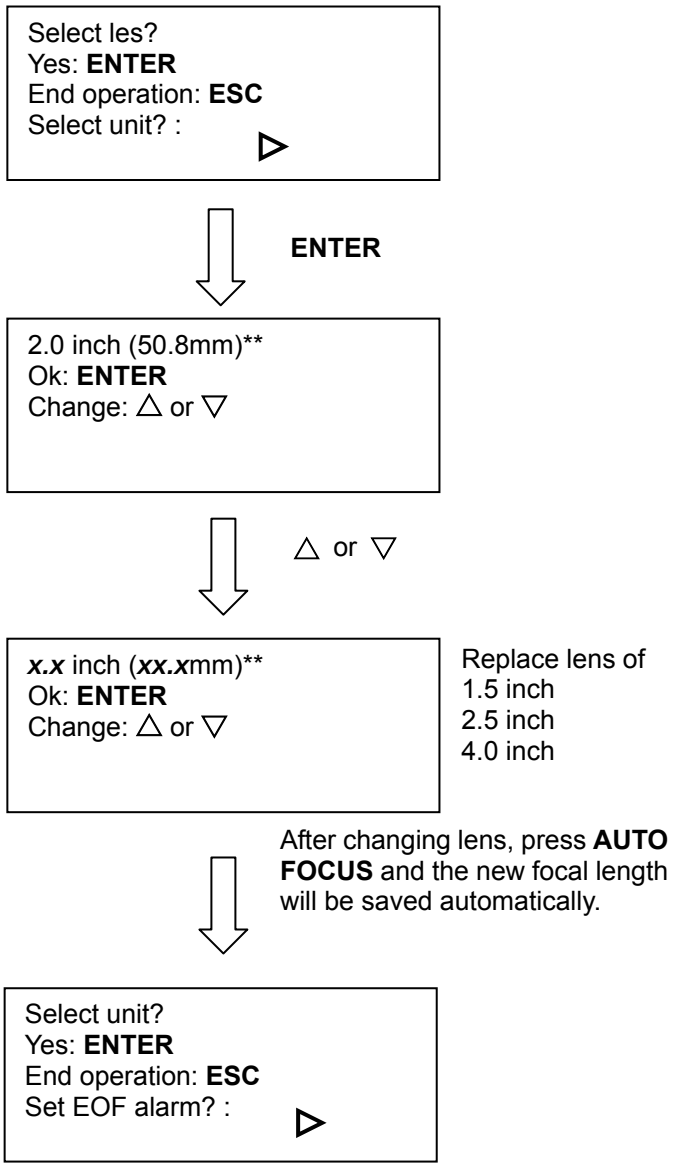
Delete all files?
All files in the buffer will be deleted by using this function when setting under Multiple file mode. This function is invalid under Single file mode. Once you stop or complete a job under Single File mode the file won't be saved in the buffer.



Select lens?
There are four different lenses for use on the LaserPro MERCURY as follows:

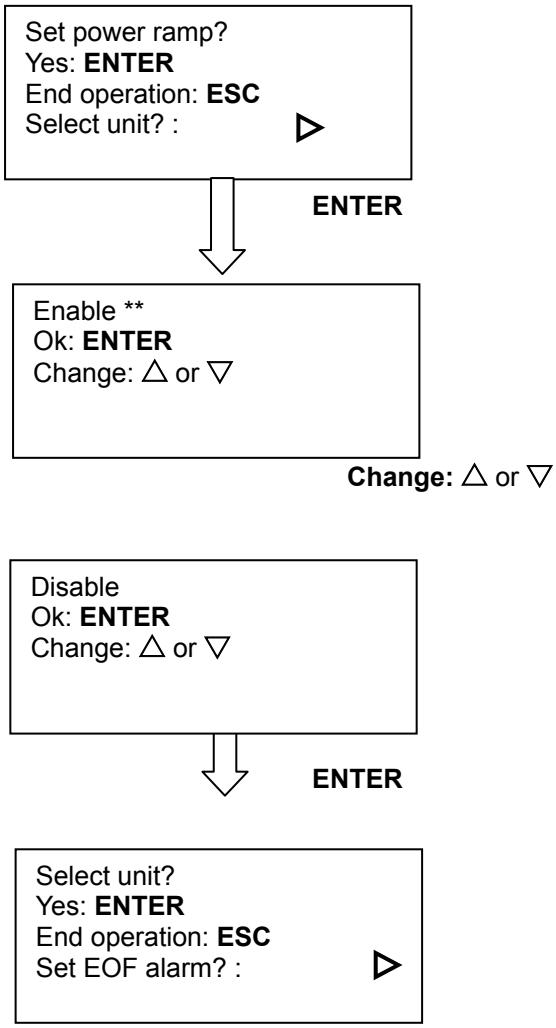
Focal Length	Resolution	Cutting capability
1.5” optional	High ↑	Thin ↓
2.0” standard		
2.5” optional		
4.0” optional	Low	Thick

The high resolution lens is designed for precision engraving, while the low resolution lens is mostly applied for cutting due to its lower beam divergence which results in a straighter cut in thick materials.
The longer the focal length, the bigger the beam spot size. Although it is not ideal for high resolution image engraving. The large spot size of low resolution lens can spreads the laser’s heat over a larger area, which helps minimizing melting thus can be applied to engrave certain kinds of plastics.

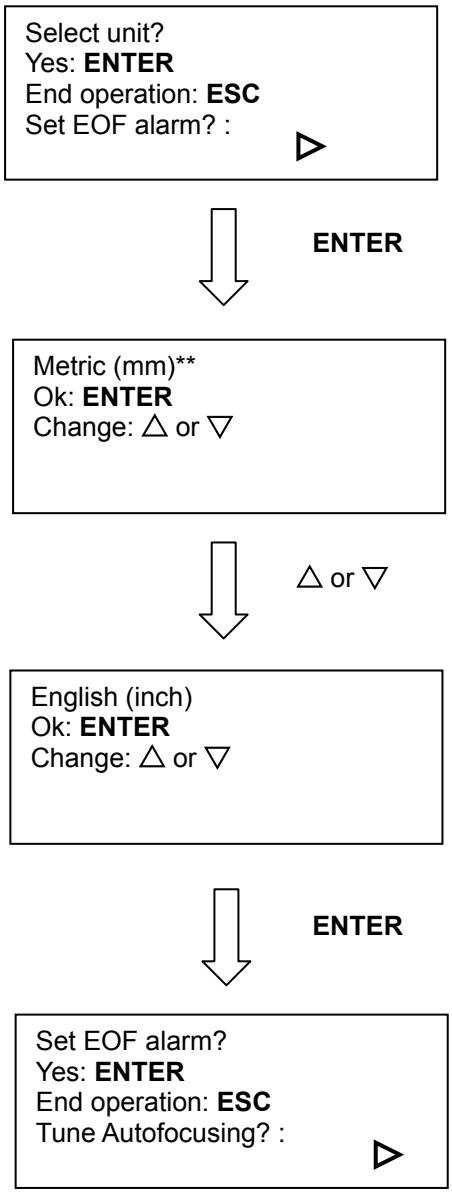


Set power ramp?
If set in Enable condition and cutting speed is 3% or above, under vector mode, the power control is enabled. If set in Disable, the power control is disabled.

Default : Enable

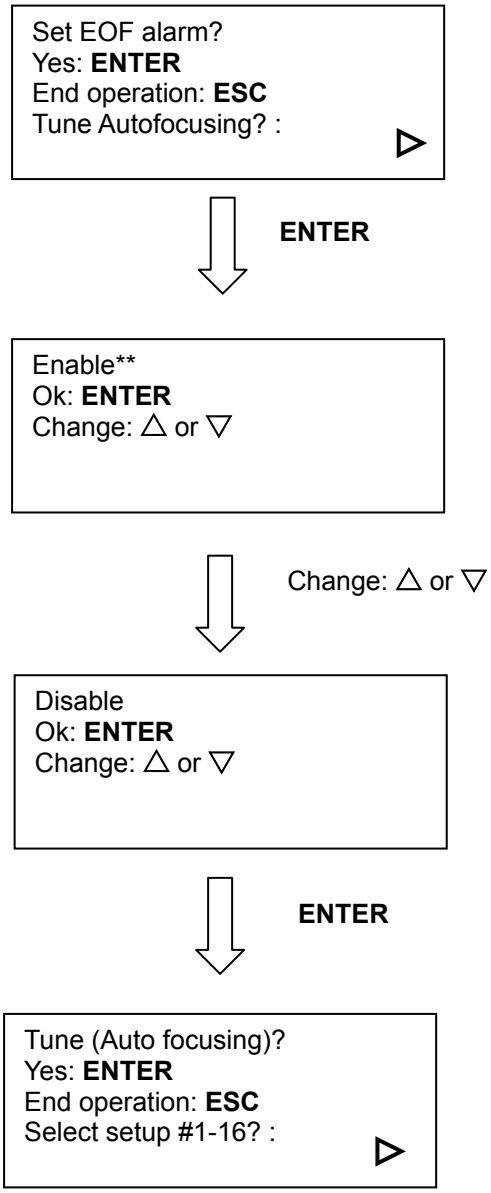


Select unit?
Set unit in Metric or English.



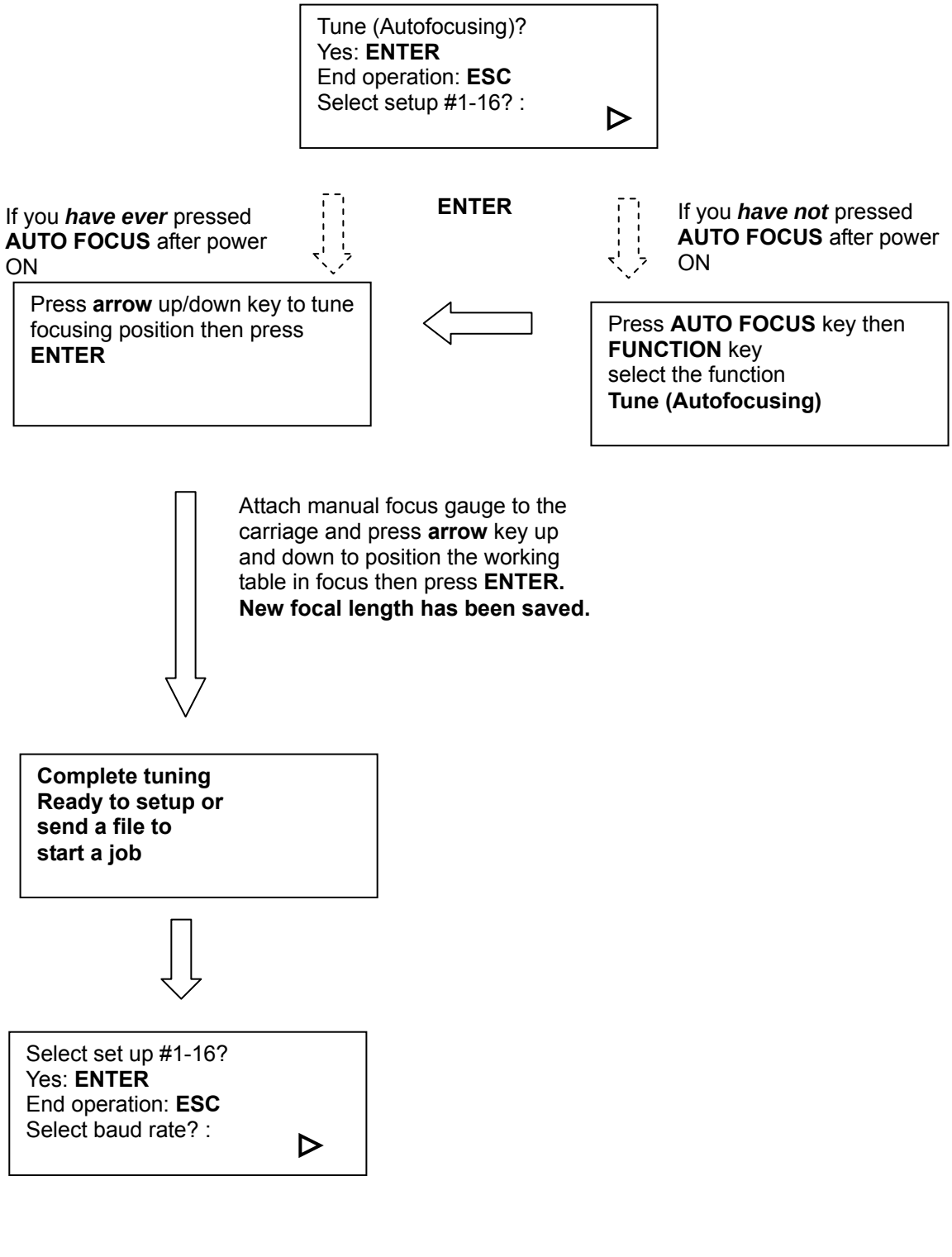
NOTE: ** means default or current setting.

Set EOF alarm?
If set in Enable condition, a beep tone sounds when **E**nd **O**F **F**ile.



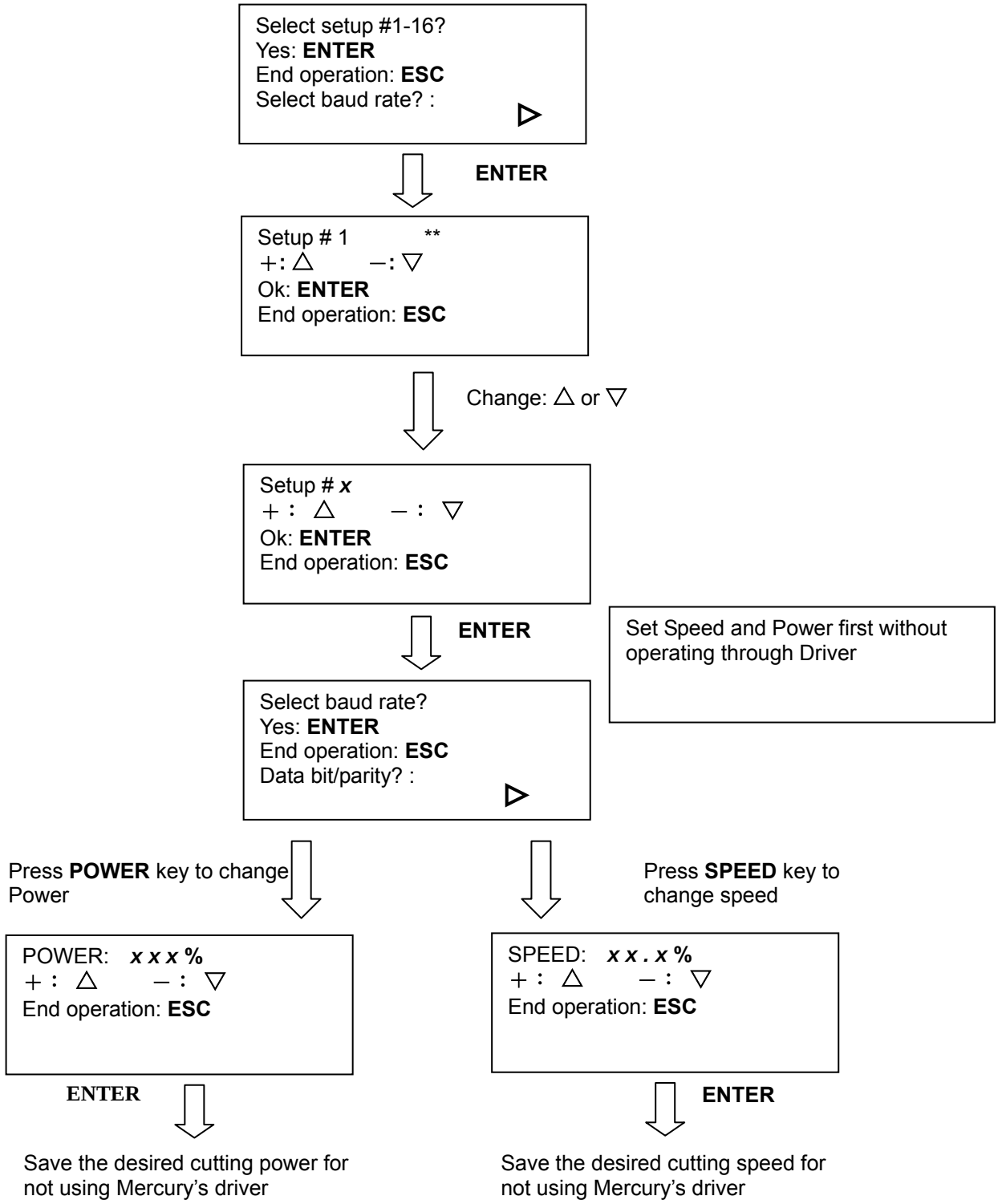
- **Tune (Auto focusing)?**

In case the focal length of auto Focus needs to be corrected, please insert the corresponding manual focal tool to the hole of the holder shown as in the Figure of **LENS and MANUAL FOCUS GAUGE**. Then, operate as follows.


Tune (Autofocusing)?
Yes: ENTER
End operation: ESC
Select setup #1-16? :
If you have ever pressed AUTO FOCUS after power ON
ENTER
If you have not pressed AUTO FOCUS after power ON
Press arrow up/down key to tune focusing position then press ENTER
Press AUTO FOCUS key then FUNCTION key
select the function
Tune (Autofocusing)
Attach manual focus gauge to the carriage and press arrow key up and down to position the working table in focus then press ENTER.
New focal length has been saved.
Complete tuning
Ready to setup or
send a file to
start a job
Select set up #1-16?
Yes: ENTER
End operation: ESC
Select baud rate? :

- **Select setup #1-16**?

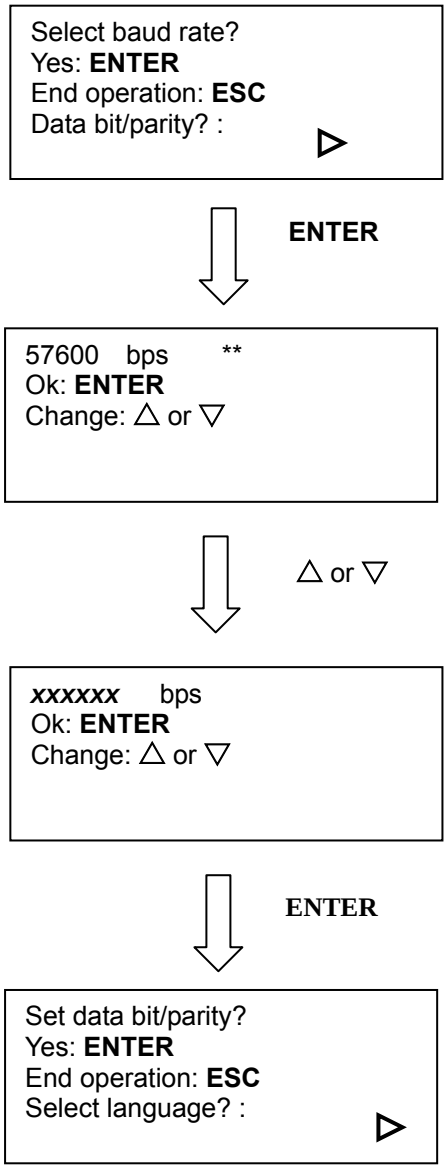
You can assign 16 different colors individually for speed and power to achieve a variety of cutting effects. **This function works when your software package can output HPGL plot without using MERCURY's driver.**


Select setup #1-16?
Yes: ENTER
End operation: ESC
Select baud rate? :
ENTER
Setup # 1 **
+: △ −: ▽
Ok: ENTER
End operation: ESC
Change: △ or ▽
Setup # x
+ : △ − : ▽
Ok: ENTER
End operation: ESC
ENTER
Set Speed and Power first without operating through Driver
Select baud rate?
Yes: ENTER
End operation: ESC
Data bit/parity? :
Press POWER key to change Power
Press SPEED key to change speed
POWER: x x x %
+ : △ − : ▽
End operation: ESC
SPEED: x x . x %
+ : △ − : ▽
End operation: ESC
ENTER
ENTER
Save the desired cutting power for not using Mercury's driver
Save the desired cutting speed for not using Mercury's driver

NOTE: ** means default or current setting.

- **Select baud rate?**

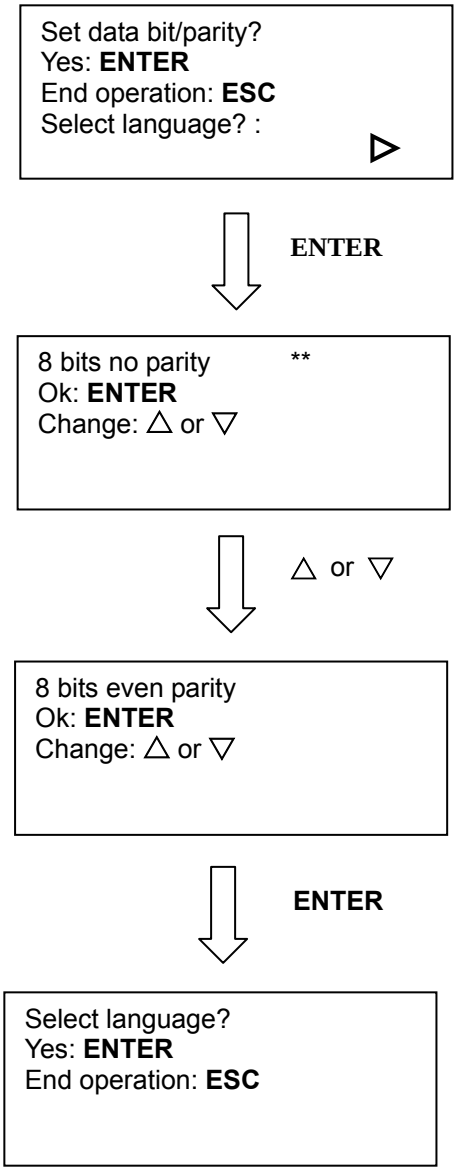
Baud rate is to determine the speed of data transmission of serial port to communicate with the host computer.
Setting range: 9600, 19200, 38400, 57600
Defaults: 57600



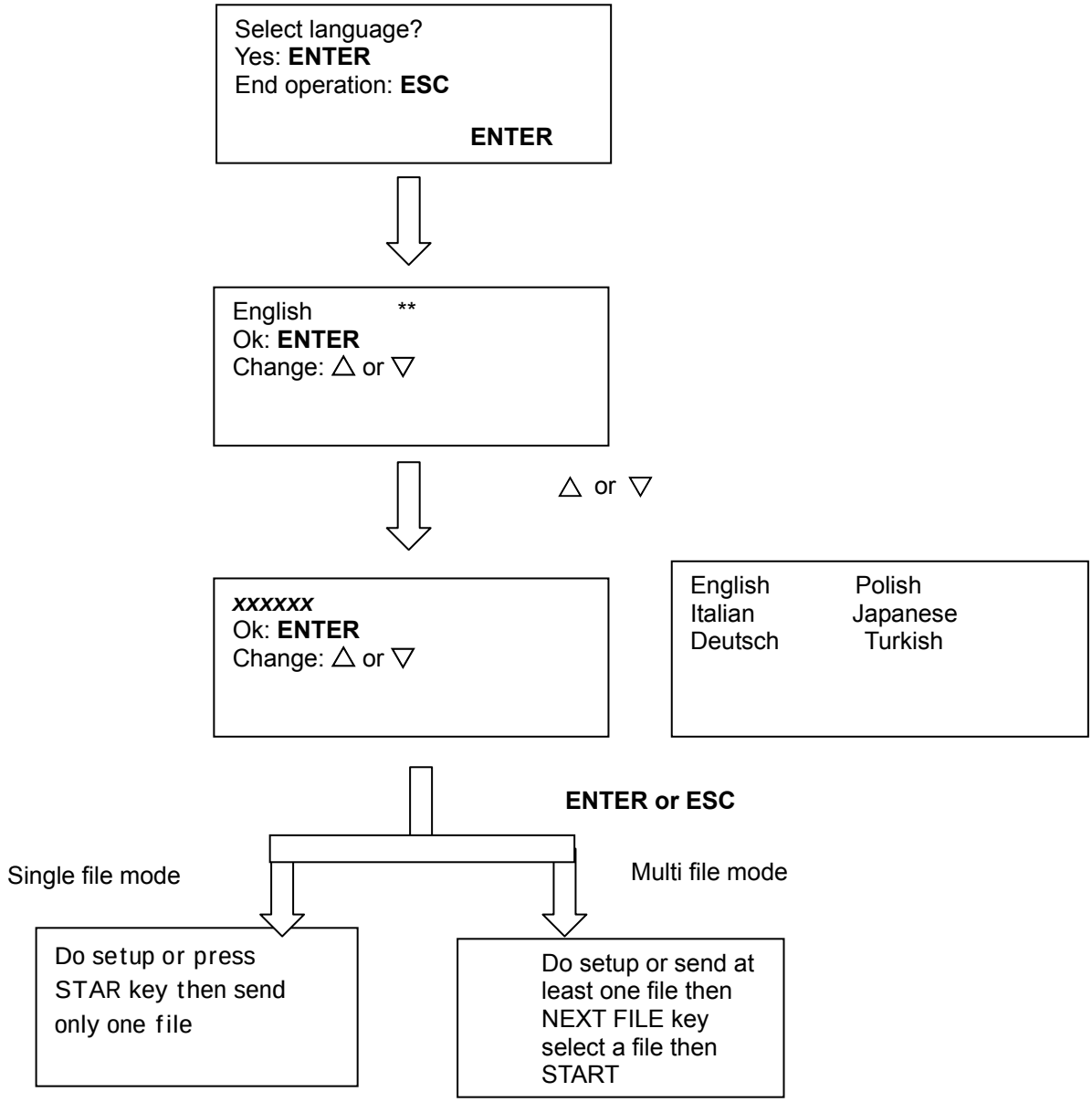
NOTE: ** means default or current setting.

- **Set data bit/parity?**

Data bits refer to the size of one block of data and **parity** is used to check if data was received correctly or not. The **data/parity** feature is to adjust the byte format and parity type in order to communicate with the host computer through serial port.



- **Select language?**



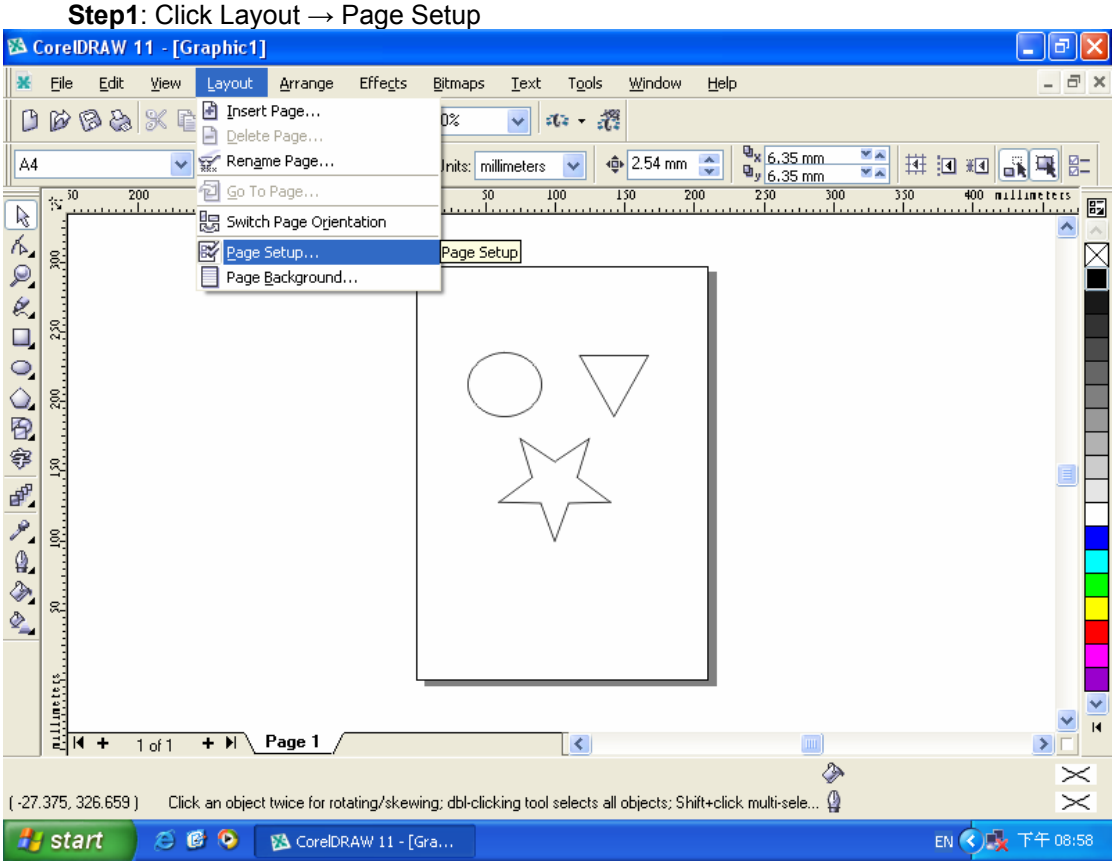
NOTE: ** means default or current setting.

Editing Jobs

A. CorelDRAW Page Size Setting

Please ensure the laser engraver is set as the **Default Printer** before following the next steps.

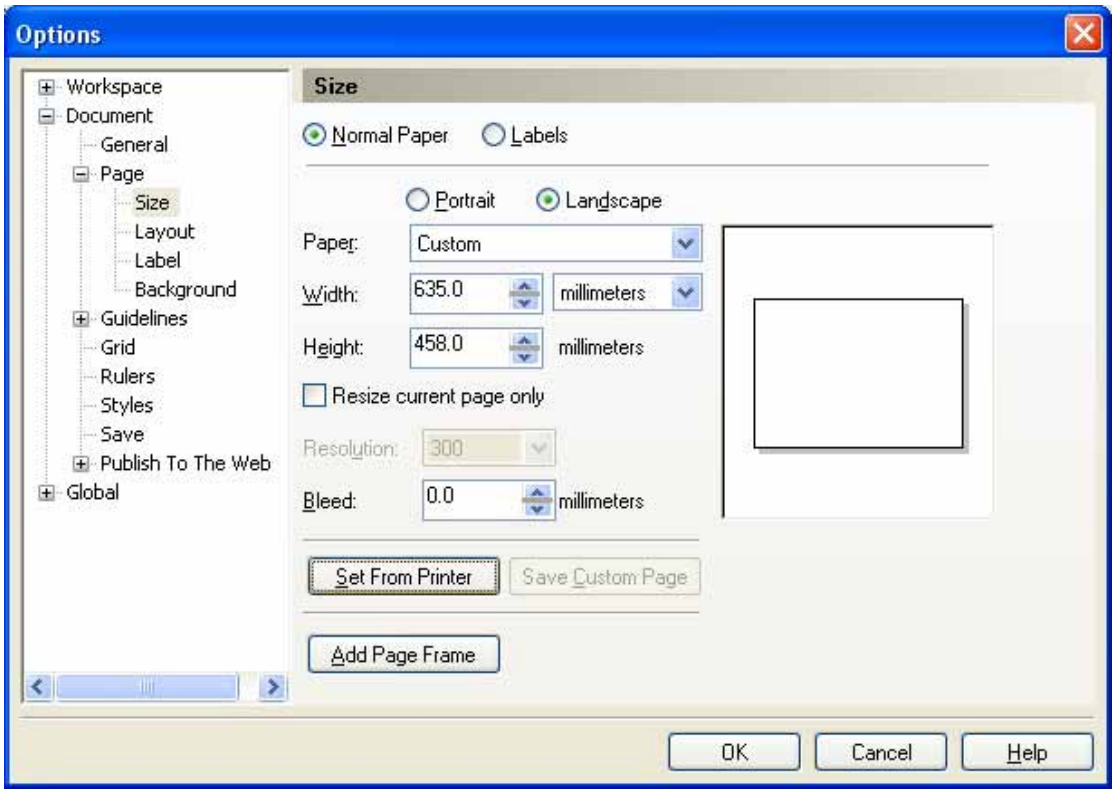
Step1: Click Layout → Page Setup



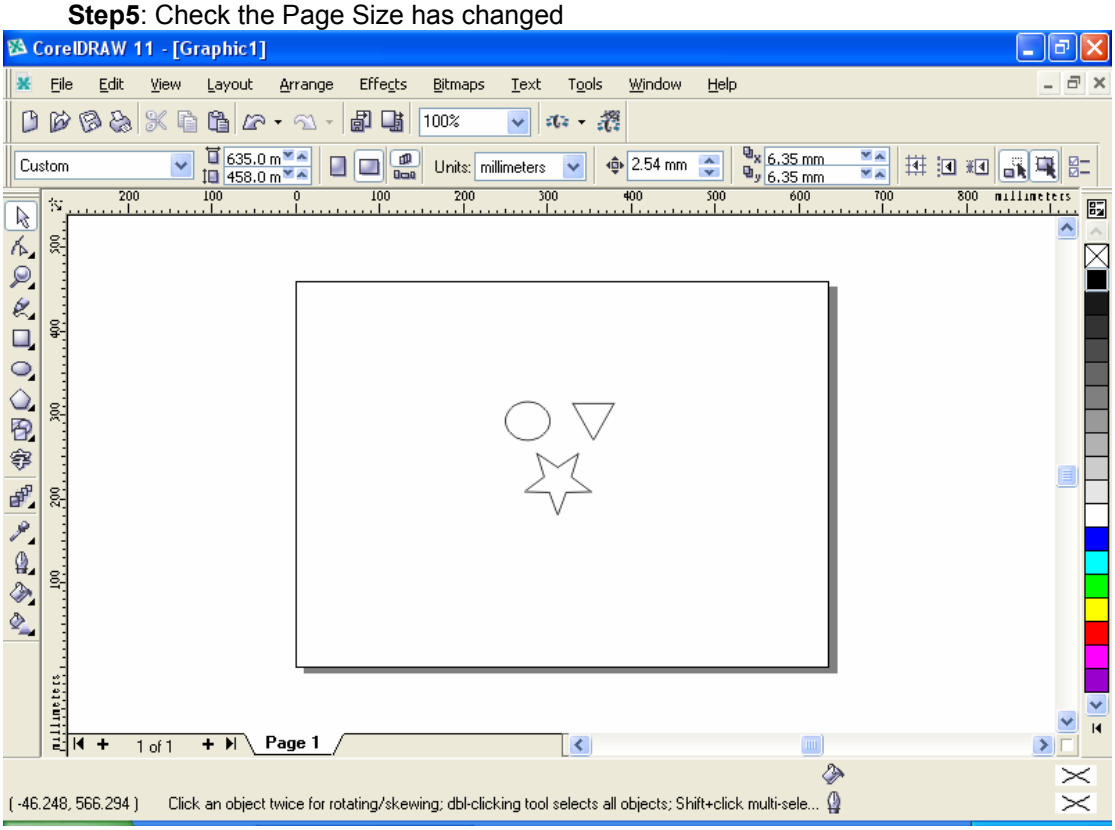
Step2: **Set From Printer**
Step3: Click the page size to be the same as the printer's paper size.
(Ensure the **Normal Paper** and **Layout** options are checked.)
Step4: Click **OK** to complete the page size setting.

Notice

Pre: In some instances, the LCD panel shows a message of "Graph was clipped" or the laser engraver is engraving at some strange location in some unpredictable way. The result engraved artwork is scrapped.
Post: This is caused by the mismatch of Printer's paper size and the CorelDraw's page size. To matches these two size, please following the proceeding instructions.



Step5: Check the Page Size has changed

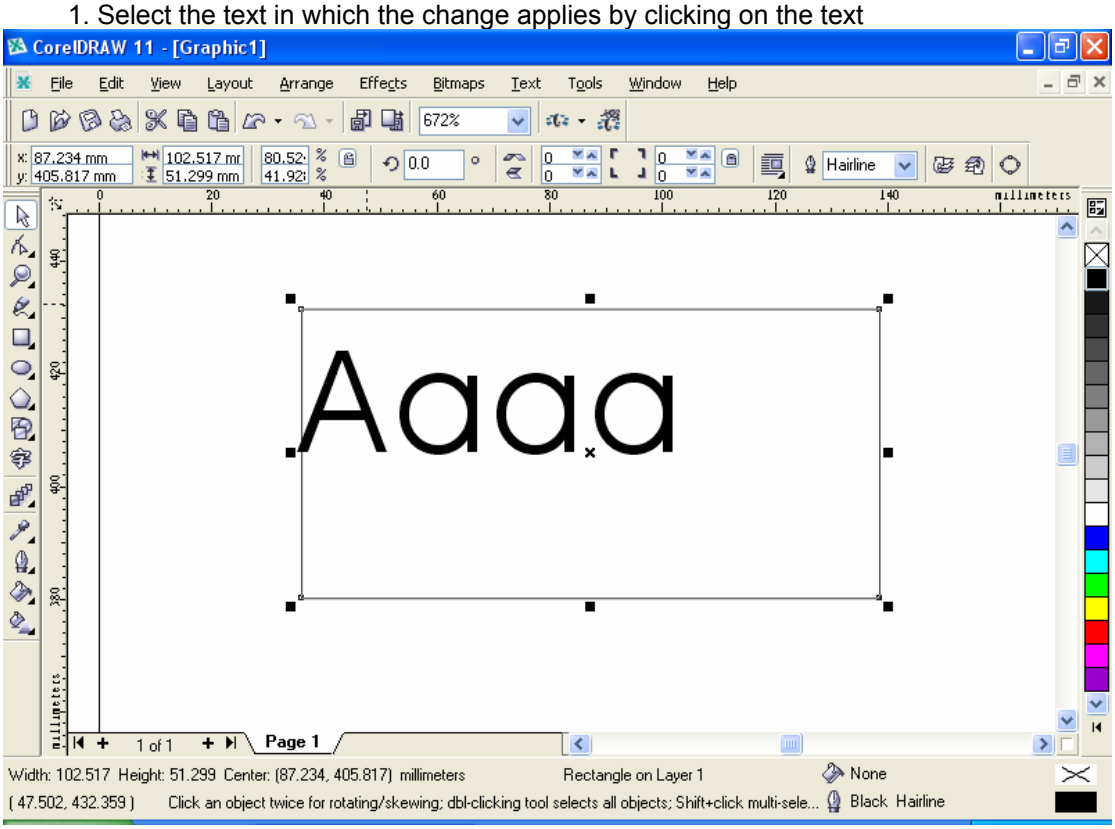


B. Vector Cutting

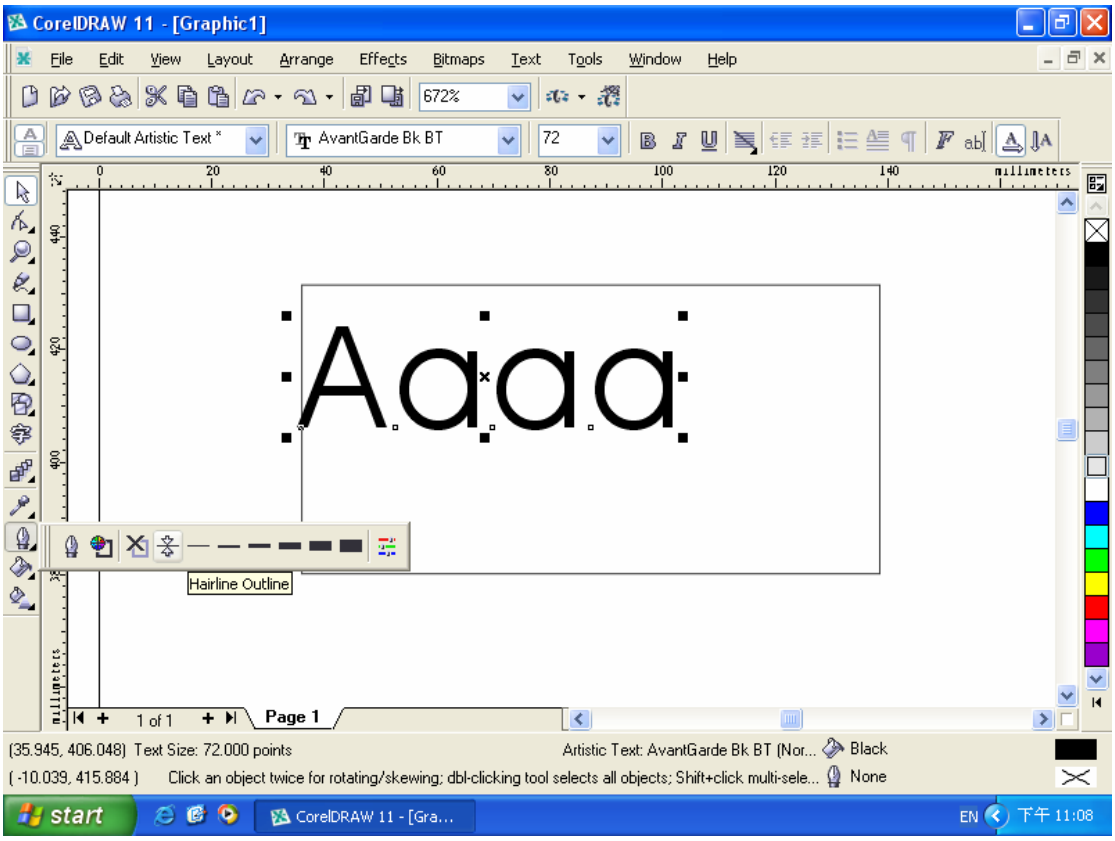
The laser cutting is NOT doing a proper *cutting*, because the width of the text's outline is not set to its *thinnest* width. The MS-Windows® driver determines raster engraving or vector cutting based on the outline width of an object. Therefore to achieve a vector cutting, please set the text's filled with white color and the outline to its thinnest width in CorelDraw.

How to perform vector cutting:

1. Select the text in which the change applies by clicking on the text

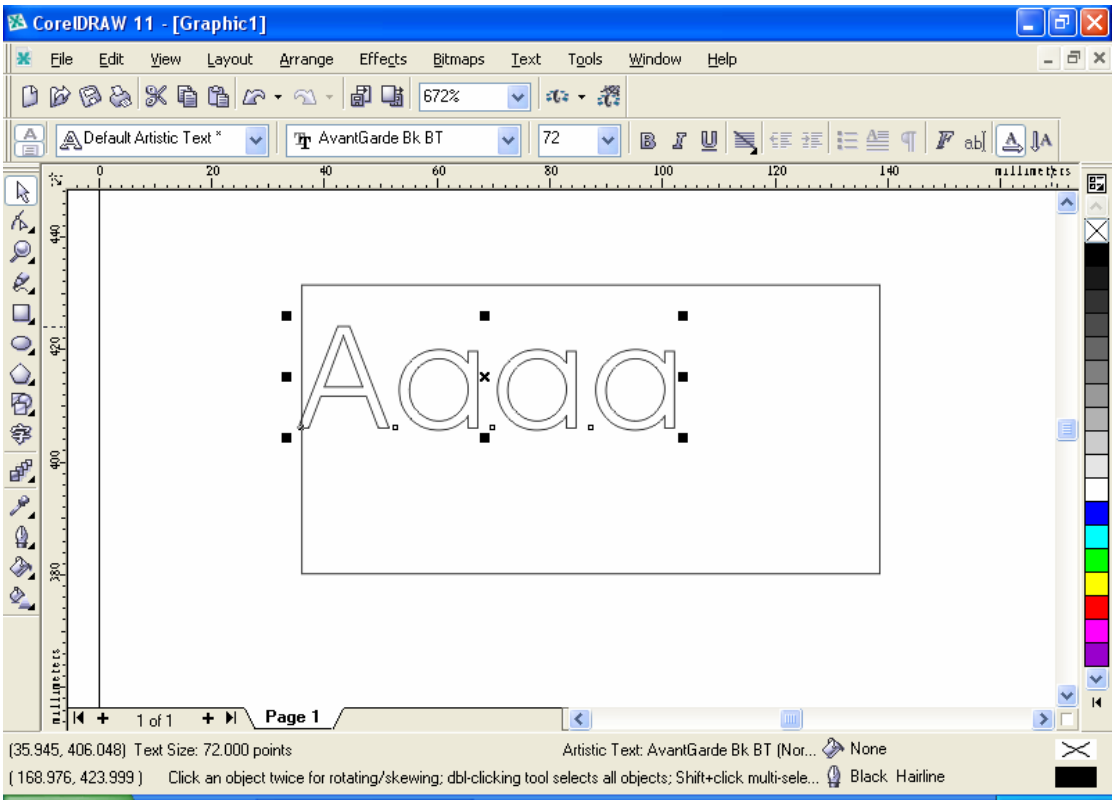

CorelDRAW 11 - [Graphic1]
File Edit View Layout Arrange Effects Bitmaps Text Tools Window Help
Aaaa
Page 1
Width: 102.517 Height: 51.299 Center: (87.234, 405.817) millimeters
Rectangle on Layer 1
None
Black Hairline
Click an object twice for rotating/skewing; dbl-clicking tool selects all objects; Shift+click multi-sele...

2. Change the text's fill color to white by left clicking on the white color of "CorelDraw Color Palette" located on the right hand side of the screen.

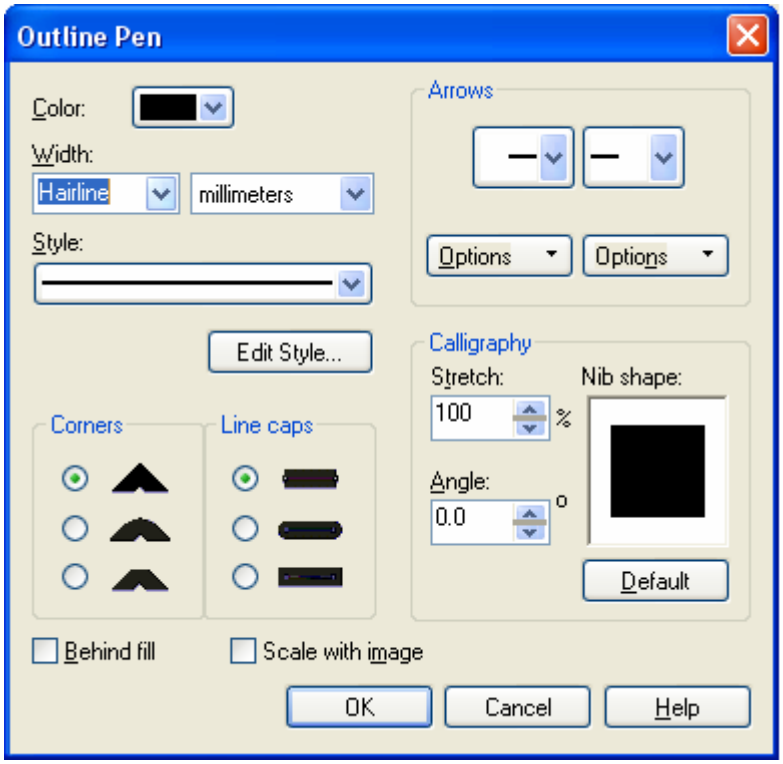

CorelDRAW 11 - [Graphic1]
File Edit View Layout Arrange Effects Bitmaps Text Tools Window Help
672%
Default Artistic Text *
AvantGarde Bk BT
72
Aaaa
Hairline Outline
1 of 1
Page 1
(35.945, 406.048) Text Size: 72.000 points
Artistic Text: AvantGarde Bk BT (Nor... Black
(-10.039, 415.884) Click an object twice for rotating/skewing; dbl-clicking tool selects all objects; Shift+click multi-sele... None
start
CorelDRAW 11 - [Gra...
EN 下午 11:08

3. Change the text's outline color by *right clicking* on the desired color on CorelDraw Color Palette.

Notice
If the width of the line to be cut is not set at minimum value, the laser is going to performing etching instead of vector cutting. The laser unit looks like engraving from left to right and right to left instead of cutting.


CorelDRAW 11 - [Graphic1]
File Edit View Layout Arrange Effects Bitmaps Text Tools Window Help
672%
Default Artistic Text *
AvantGarde Bk BT
72
Aaaa
1 of 1
Page 1
(35.945, 406.048) Text Size: 72.000 points
Artistic Text: AvantGarde Bk BT (Nor...
None
(168.976, 423.999)
Click an object twice for rotating/skewing; dbl-clicking tool selects all objects; Shift+click multi-sele...
Black Hairline

4. Change the outline to its thinnest width by *right clicking* on the selected text
5. Go to the "**Properties"** option
6. Click on the **"Outline"** tab and change the "**Width"** to its thinnest dimension.



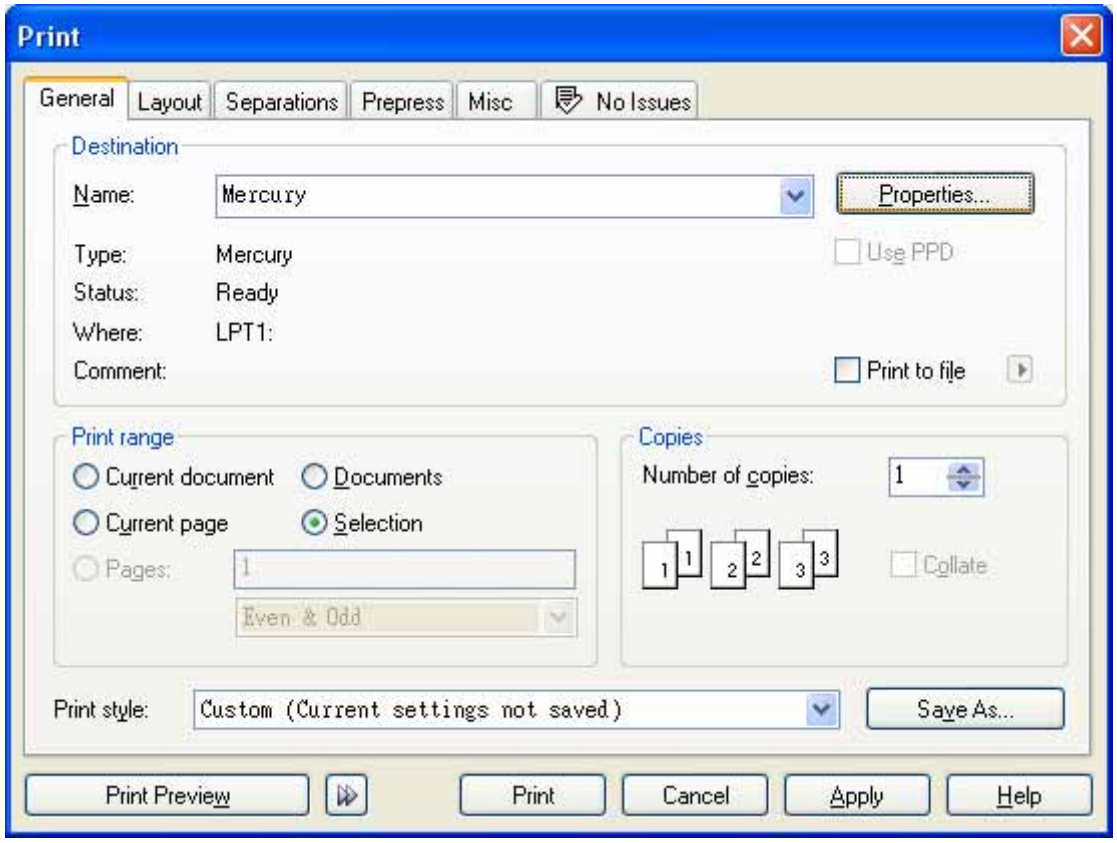
7. Click on “**OK”** to apply the changes.
8. Print out the *selected text* again and the laser will do the letter cutting.

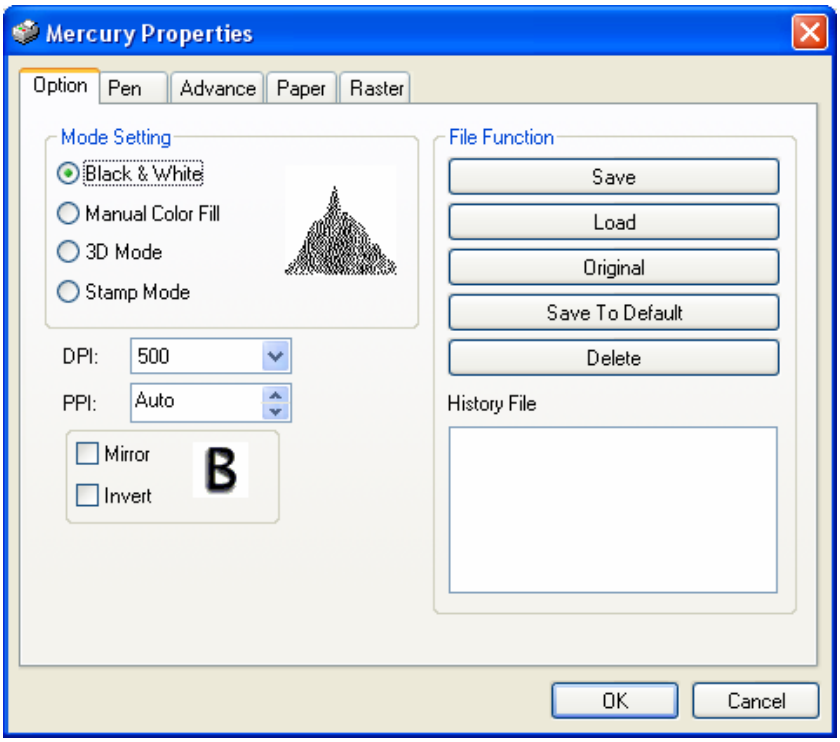
C. Raster Engraving

Laser engraver prints raster as grids or dots of individually pixels, any digital or scanned images can be processed by a laser engraver. When doing raster engraving, the laser would move from left to right or right to left. After the image or graphics is ready, please go further to the laser printing operation as next paragraph is shown.

Printing – Mercury Driver Editing

After completing the editing job, choose **File** → **Print** and click **"Properties"** to access Mercury driver parameter settings.

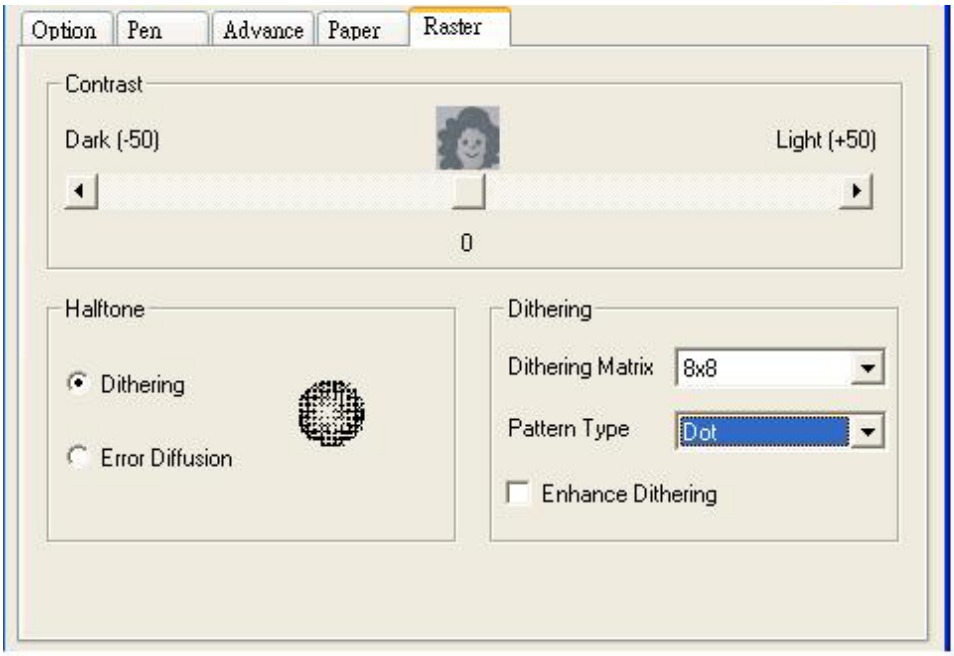




A. Choose Printing Mode

A-1 B/W (Black & White) Mode

It is useful to activate this mode when using clip art or drawings with several colors, shades of gray, or many outlines. This mode will create a laser output similar to that of a laser printer. The entire selected image will be engraved using a single pen, black one (power & speed setting). The Mercury driver will interpret colored and shaded areas as different shades of gray / halftone areas, and it is a collection of dots. The resolution and depth of these halftone areas can be adjusted with the DPI, the B/W mode dithering settings from 2x2 to 8x8, error diffusion, and different pattern types Experiment with these different settings to get the optimal results for your application.



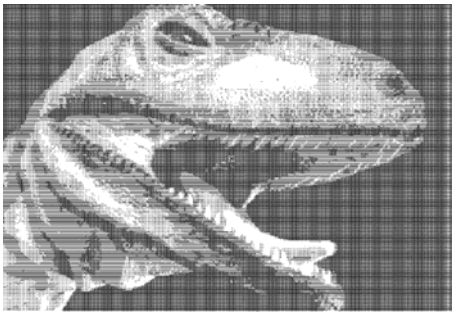
- Dithering type – The gray areas of image will be filled with different dot/ grid density from a 5- grade halftone with 2x2 dots to a 65- grade halftone with 8x8 dots. 8x8 dithering type would presents the image into shading effect with more dots than the 2x2 dithering, while the 2x2 dithering type would have smaller dots than 8x8, that produces higher resolution. The dithering type choice would depend on the image and application.

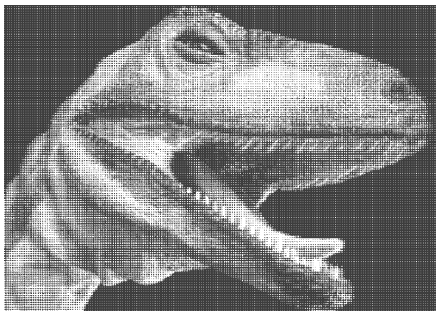
- Enhance dithering – The enhance dithering as what it reads would help to compensate the shortage of smaller grade halftone type, such as choosing 2x2 dithering type and enhance dithering at the same time, the image would be printed with 256- grade halftone and 2x2 dots, therefore, better shading effect with small 2x2 dots/ grids.

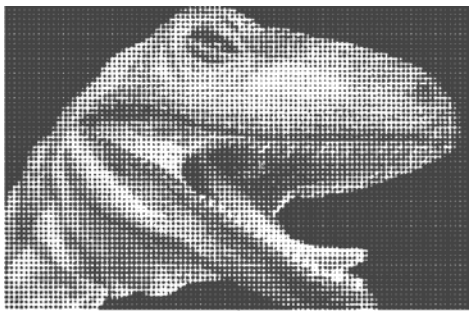
- Error Diffusion – The error diffusion presents the shade of image as a spread halftone instead of dots, therefore more detailed.

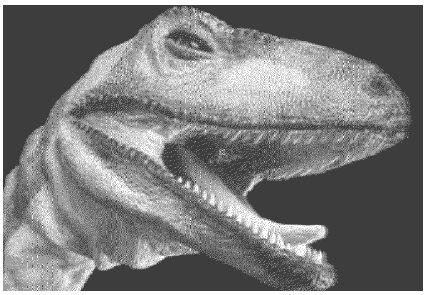
- Pattern Type- The halftone pattern has three kinds of layout options, which determine the shape of each grid/ dot to compose the shading effect of raster image.

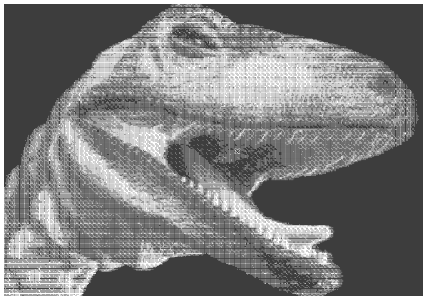
a. **Dot:** A halftone pattern consists of circle dots.
b. **Corner**: The dark dot spread from the left upper corner of the pattern result in a little
triangle shape to imitate a shading effect.
c. **Bayer** : A random halftone pattern.
d. **45 degree**: a halftone pattern consists of 45 degree matrix of dot arrangement

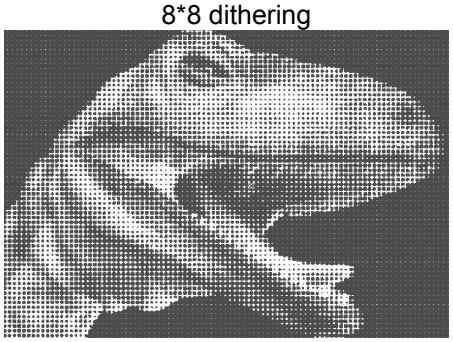

2*2 dithering

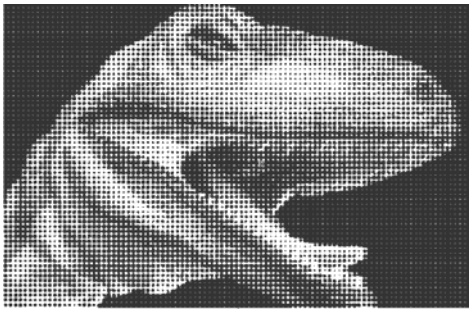

4*4 dithering

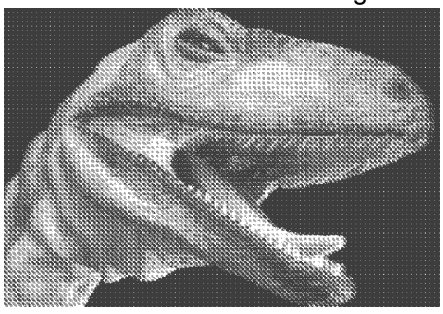

8*8 dithering


Error Diffusion

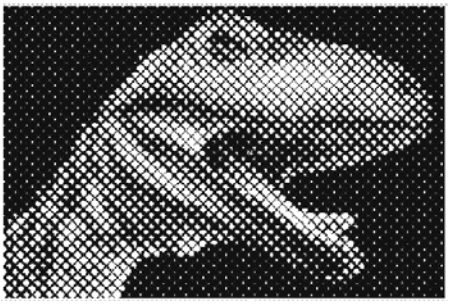

2x2 Enhance Dithering

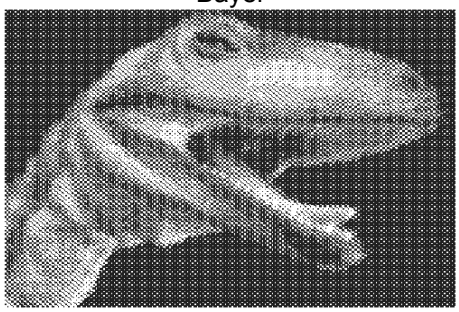

8x8 Enhance Dithering

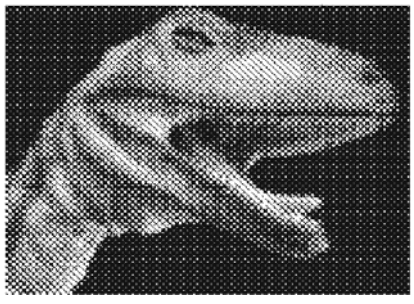

Dot

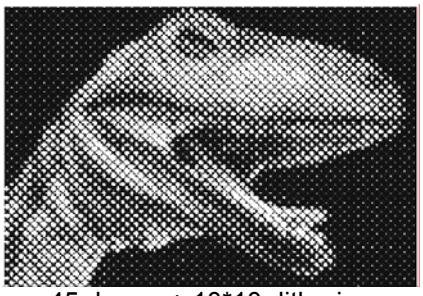

Bayer

Corner


45 degree+ 4*4 dithering


45 degree+6*6 dithering


45 degree+8*8 dithering



45 degree+ 10*10 dithering

A-2 Manual Color Fill Mode

Each power and speed setting can be linked to certain color on the layout. Totally 16 color settings are available. The desired color can be adjusted by changing the ratio of Red, Green and Blue. If the speed or power is set to 0, the corresponding color area or vector line will be invalid.

A-3 3D Mode

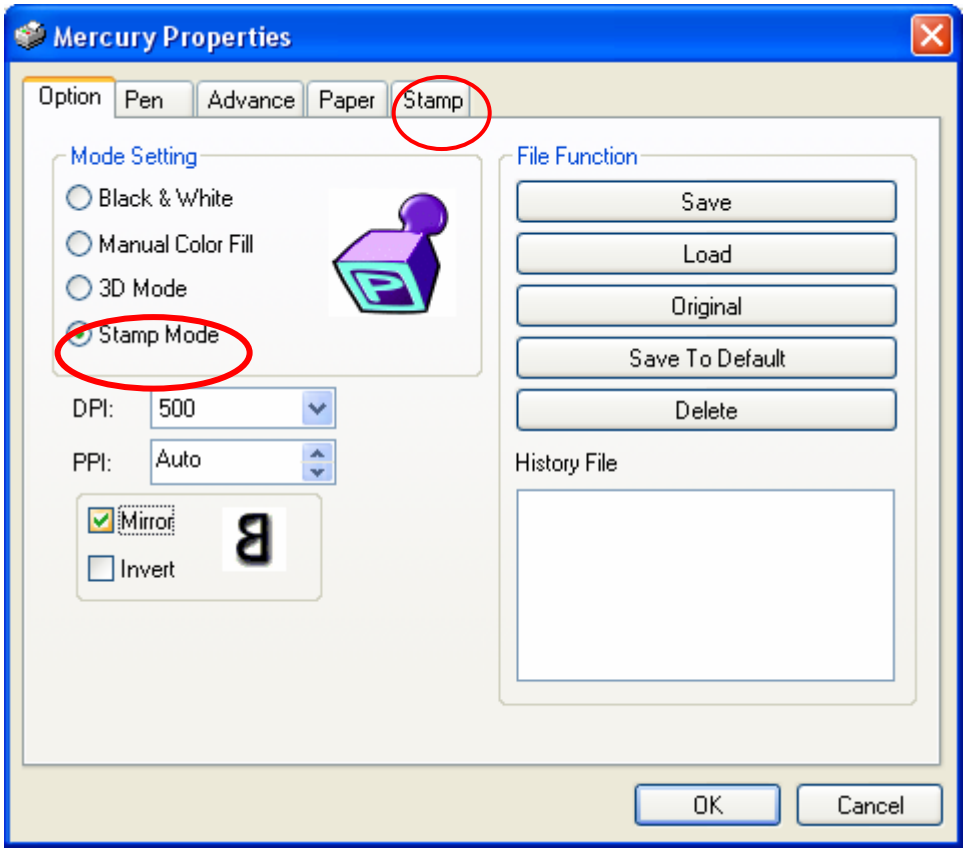
With this function, we can get the sculpture effect. The engrave image must have gray levels. The engrave image is effected by PPI, DPI, power and speed setting.

3D Image File

Sample/ Material: Density Board

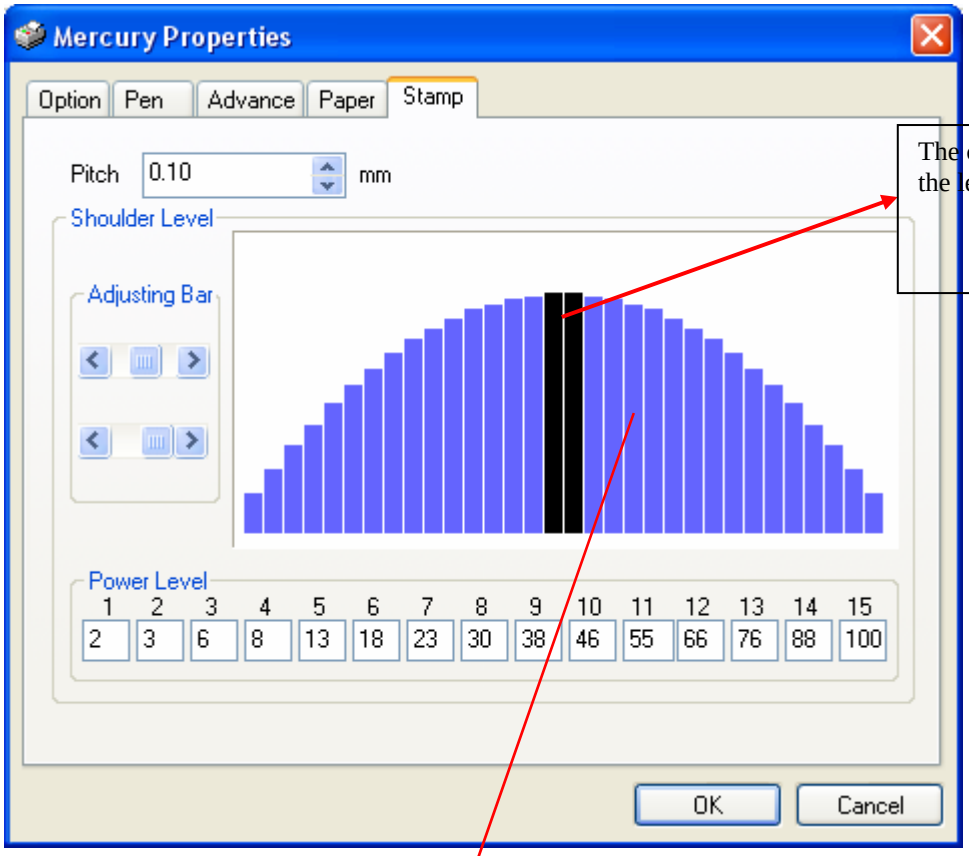
A-4 Stamp Mode

Mainly used in rubber stamp production. Create a slope base of stamp characters by setting up the **stamp parameter**. Normally the pitch number for engraving a 2~3mm thick rubber pad can be set at 0.2 or 0.3. The smaller the pitch number is, the sharper the slope is. If setting the pitch number at a very big value, it may take for a very long time for the math calculation.



■ Pitch Value & Shoulder Power Setting

The finished stamp will be a reversed image with engraved depressions and ridges. Many of these ridges may be too thin and would break off or be unstable. Creating pitch is a way to add support to the thin lines and ridges. The pitch value setting allows you to adjust the width of the ridges. Broad pitch gives the maximum amount of support for each ridge. Experiment with different pitch value settings in order to produce the stamp that is best suited for your application. You can specify the size into the pitch box under stamp mode and adjust the bar to specify different laser power level for shoulder.

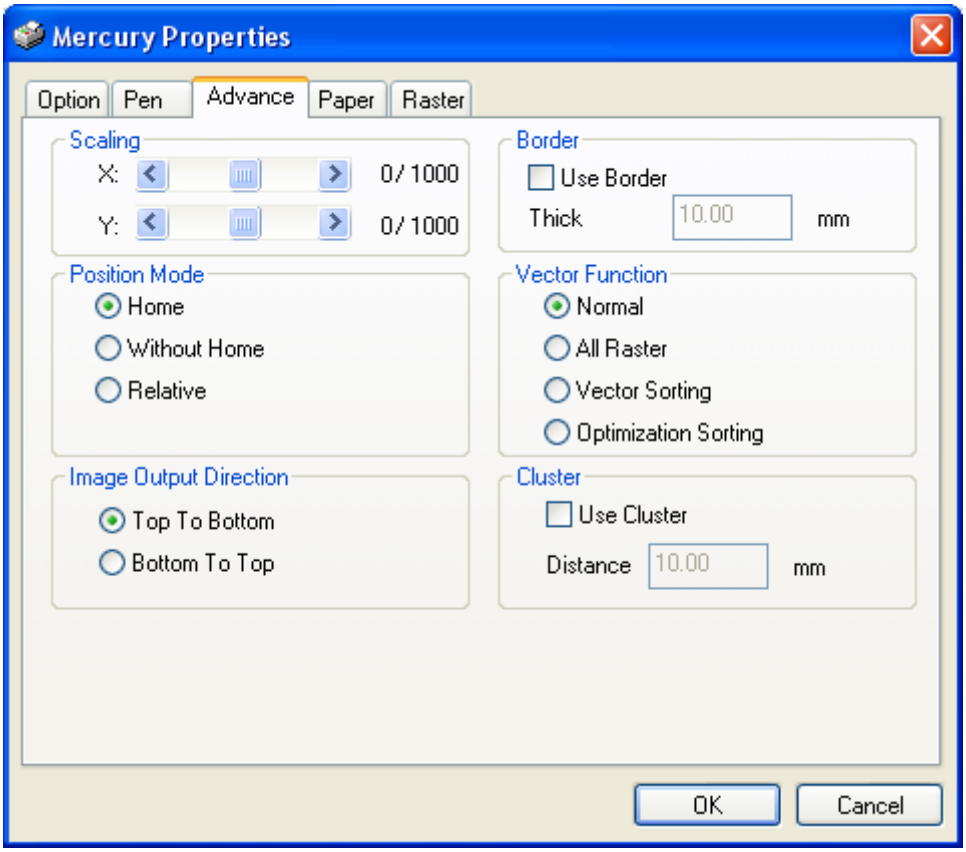


The central part presents the letter of stamp.

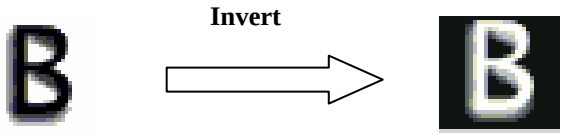
The blue bar means different laser power level to compose of the slope. Higher level blue bar gets less engraving laser power.

- Power Level of Stamp Mode
  This function is to adjust the power distribution of the slope shoulder to get the better shape of stamp's vertical profile. Select "set shoulder" in the page "Options". Enter the dialog box of stamp parameter. The black bars in the center are for the surface of each letter, while the blue bars are for the shoulders. Adjust the value of power level by adjusting bar or the left click of mouse to edit the shape of the shoulders.

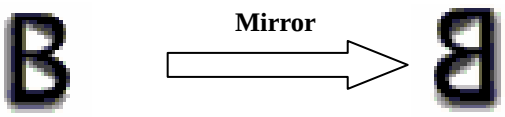
- Add Border
  You may wish to include a thin or wide border around the outline of your stamp. This can be done by creating outline greater than .001" thickness around the image. When the Mirror setting is selected, this outline will automatically be reserved as a ridge that does get engraved.



- Invert
  The Invert mode will reverse the black and white outlines and fills in the selected image. Black will become white and vice-versa, thus creating a high area that will be covered with ink when the stamp is put to use. This function is disabled when using the Manual Color Fill mode.



- Mirror
  When using a stamp, the image needs to be reversed or mirrored in order to show up properly when the stamp is in use. This setting will transfer right to left and vice-versa.

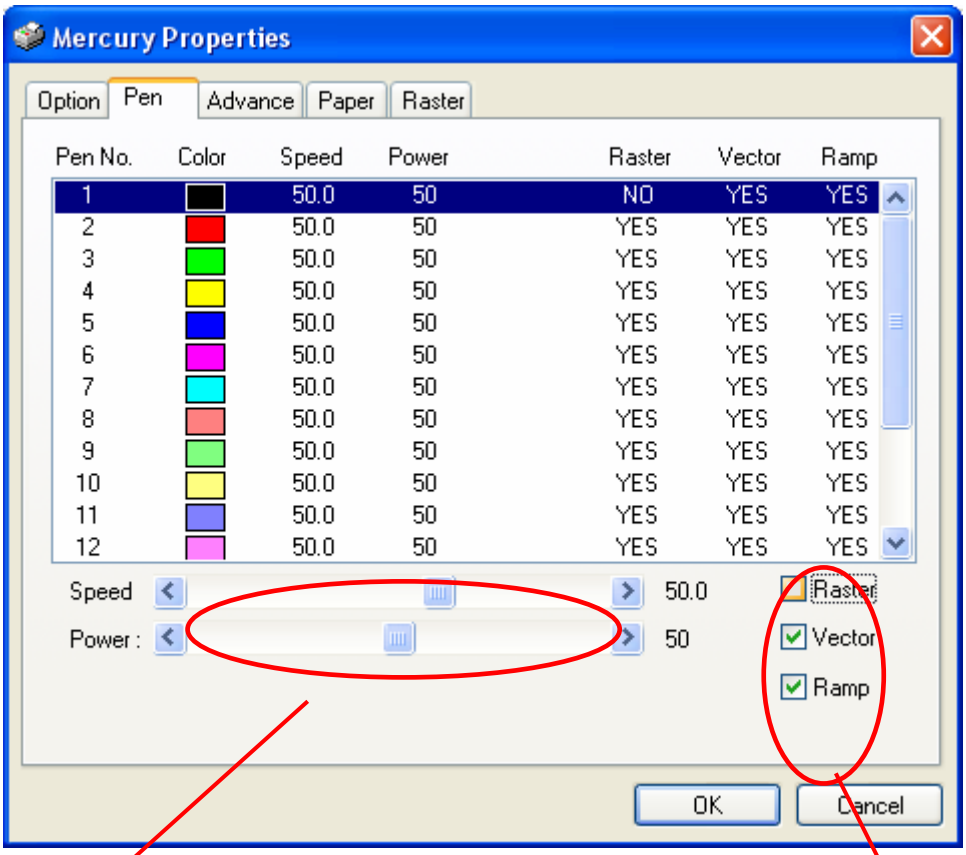


- Cutting out the Stamp
  After you have created a border around the stamp, you may wish to have the Mercury's vector setting cut out the stamp from the rubber sheet. To do this, create a thin (0.001") red line around the outline edge of the border or where ever you wish the stamp to be cut. The vector setting will always be performed after the engraving is complete.

- Stamp Production
  You may wish to create a full sheet of duplicated rubber stamps in order to have them all engraved at once, saving on material costs and operation time. To do this, copy and paste the image to the full page which is smaller or equivalent to the working table and the rubber sheet. Next make sure that the image is mirrored, inverted and that the appropriate shoulder, border, power and speed settings are in place.

B. Parameter Settings

The LaserPro Mercury allows the use of 16 different colors to represent 16 different power and speed settings when cutting and engraving. These colors are referred to as PENS. Try to think of each pen as a designated laser setting, rather than as a color. An image that is only black and white will use only one power and speed laser setting (Black). An image that includes black, red and blue colors will use three different assigned power and speed settings. In order to utilize up to 16 different pens, make sure your graphics program uses the 16 colors recognized by the driver.



Adjust speed / power for each pen

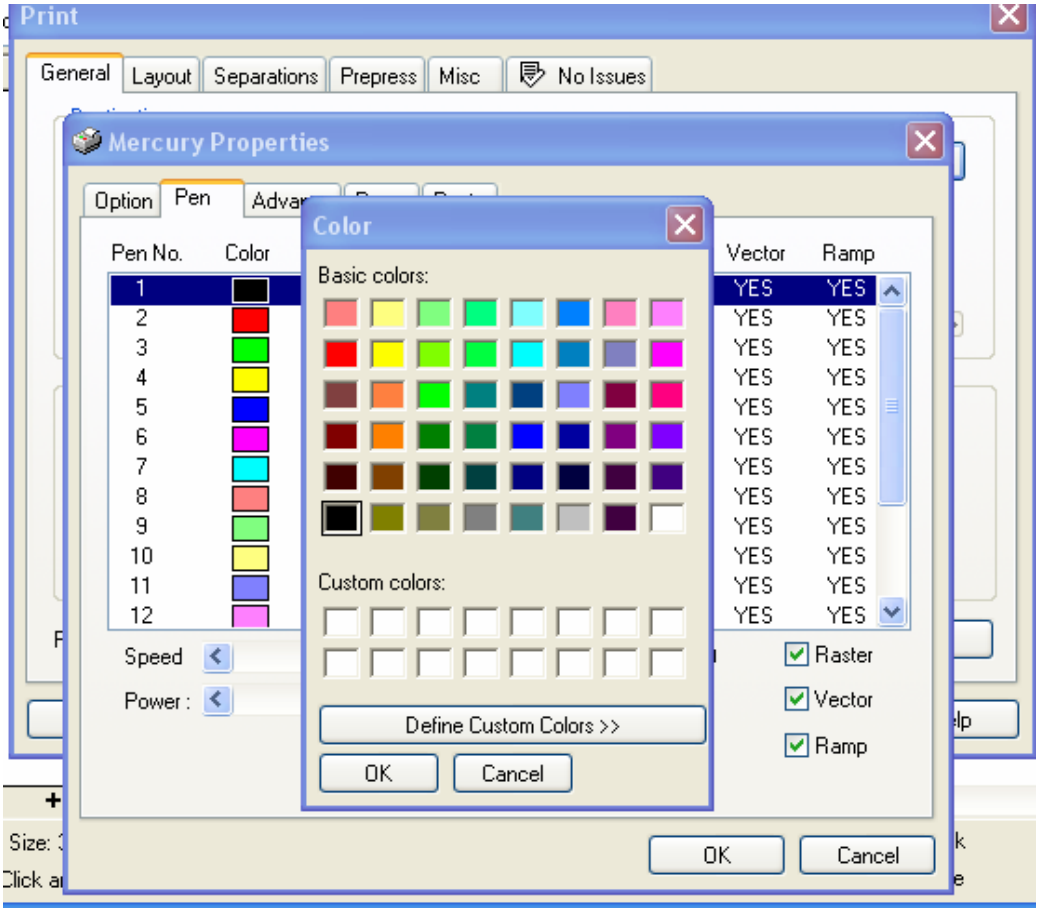
Check to enable or disable raster / vector / power ramp for each pen

B-1 Pen Settings

There are 16 available pen settings to match a specific laser setting with the different colors used in the graphic image. If your image uses black outlines, and red and blue color fills, then the driver will instruct the laser to use three different power and speed settings on the three

distinct areas. The speed and power settings designated to each pen color, will represent a proportion of the master control speed and power settings.

If you would like to use a color not included in the driver's original 16 colors, please double click on the specified pen and the color manager window would jump out then you can select the color you would like to apply.



B-2 Speed
Speed setting here determines the speed of laser's motion system during operation. The range is from 0.1% ~ 100%. 100% speed is equivalent to the fastest speed and will be the speed that the motion system travels when cutting or engraving straight lines. The machine will automatically slow down when it is cutting or engraving curves.

B-3 Power
Power setting here would decide the laser's power during operation. The range is from 0.1% ~100%. The percentage represents the power of each laser pulse fired. Power and speed work together to determine the depth of a cutting and/or engraving. Higher power and slower speeds will produce the deepest engraving.

B-4 Raster Vector On/Off
Each color in the graphic image may include a variety of color fills and very thin lines. It is then possible for one pen color to require both raster and vector modes. Turning either Raster or Vector off will force the driver to ignore the pen color's fills or thin lines. You can check the Raster or Vector box to turn on/ off the function.

B-5 Ramp On/Off

When enable the Ramp, it means the laser firing density is independent to the laser carriage moving speed, which helps to deliver great cutting performance when trying to cut through thick material such as acrylic sheet.

NOTE: When doing thin material cutting such as paper or textile, please disable the Ramp function.

B-6 DPI – Dots Per Inch

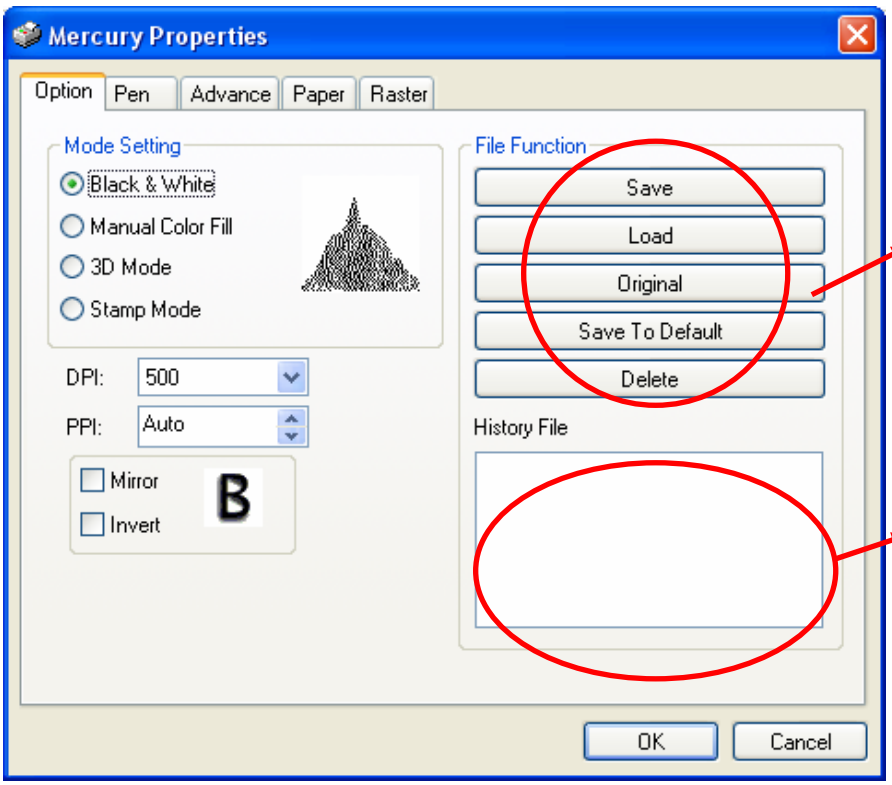
This setting determines the quality of image resolution was using the raster engraving. DPI can also be referred to as horizontal lines per inch or fill spacing. The amount of raster strokes per vertical inch of travel will affect the image resolution of the engraving. Higher DPI settings will have cleaner and deeper engravings, but will take longer to complete. Lower DPI settings will have coarser and shallower engraving, but will take less time to complete. Experiment with different settings to get your desired effect. You can find the DPI function at Mercury driver-> Properties-> Option.

B-7 Save Parameters Setting

Each job may require unique Mercury driver parameter settings. After you have adjusted all of the settings, remember to save it in a desired location for future use. Press the SAVE icon and save the parameter settings to the proper directory as wished or default for all applications, then you can see the saved files shown in the History Files column. You can access your saved settings by clicking on Load or by using the History scroll, which keeps track of the settings most recently used.

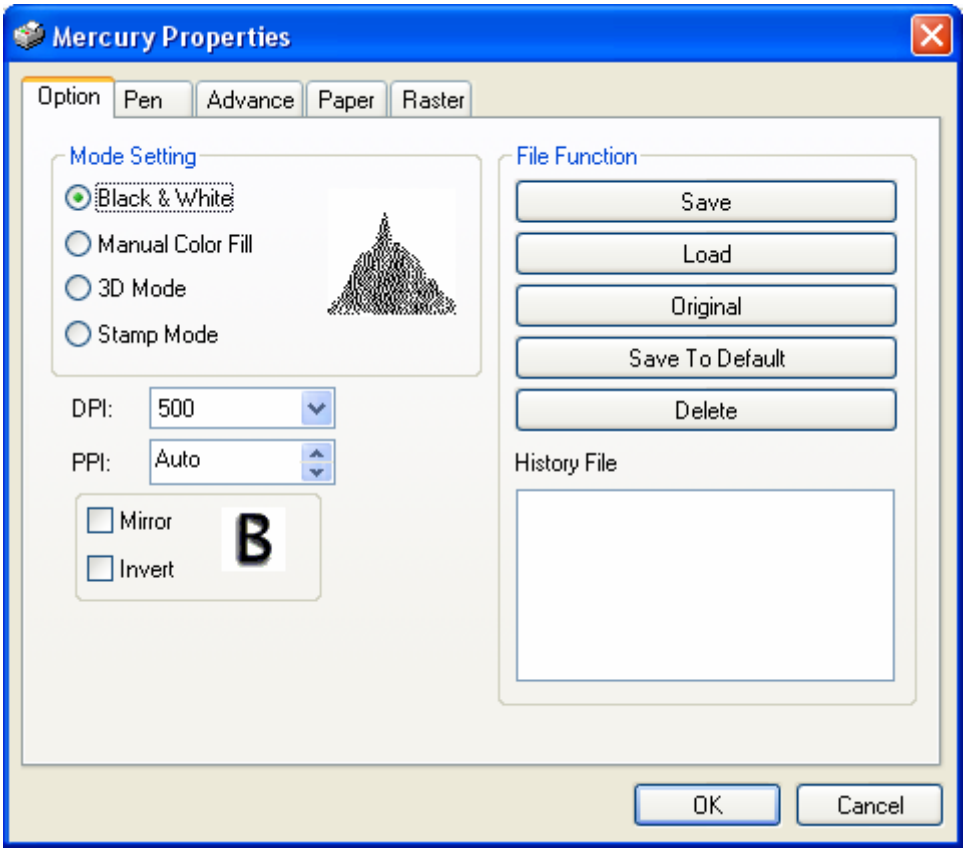
Note:

1. These editing options can be saved in image files such as Corel Draw graphics with printer driver parameters setting inside or can be saved a s the default settings in Mercury driver for future files.
2. Please make sure your ID to log in the computer is set to “Administrator ” level, therefore OS of 2000/XP can allow you to save parameter settings.



File parameter setting save, delete or load function.

Review and select the saved file parameter setting here.



NOTE: If you wish to use Border and Cluster, then the border must be less than the distance specified in the Cluster setting.

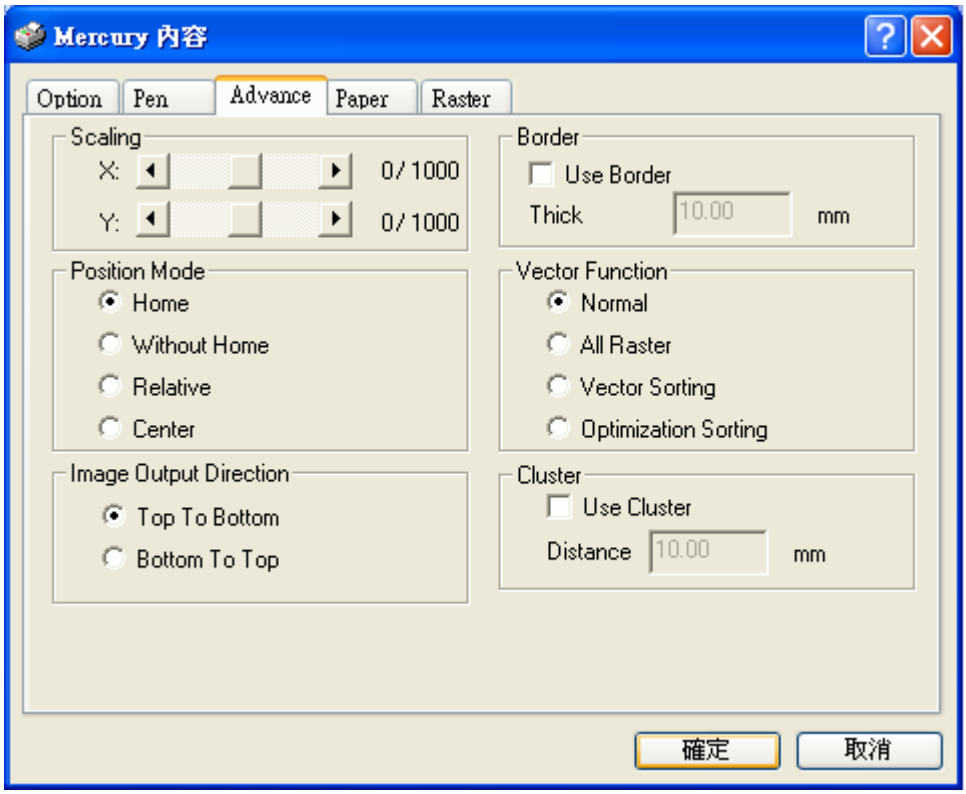
C. Advance Setting

C-1 Scaling

Scaling function enables you to adjust output inaccuracy when you find the actual output scale is different from what you set in the computer, you can use scaling function to modify it and get a perfect one. Positive value is to enlarge the size, negative is to reduce size. For examples, adjust the scale by +10 to enlarge the object's size by 10/1000.

C-2 Position mode options

- **Home:** Focus carriage goes back to the upper right position after finishing a job.
- **Without Home:** Focus carriage stops at the last position of a data file. You can engrave inside a bowel or a concave object to prevent hitting the object.
- **Relative Move:** You can place the focus carriage at any place you want to start a job. When finishing a job, the focus carriage will move back to the starting point. You can engrave inside a bowel or a concave object to prevent hitting the object.
- **Center Mode:** The laser will recognize whenever location the lens carriage (the red beam) is anchored as the center of the to-be-engraved graphic.



C-3 Image Output Direction

- **Top to Bottom –** The laser would engraver from top to bottom of the image.

- **Bottom Up –** Normally, the LaserPro Mercury engraves from top to bottom, left to right. Selecting Bottom Up will force the machine to start from the bottom and work its way to the rear of the working table. Some laminates will produce dust that may get lodged in the engraved area if the machine engraves from top to bottom. Since the exhaust system is located at the rear of the machine, the dust will be sucked away from the engraved area.

C-4 Vector Setting

- **All Raster Output –** When choose “all raster output” to print graphic including vector line and raster image, the laser would take the vector line as raster data and print the whole graphics as raster engraving image.

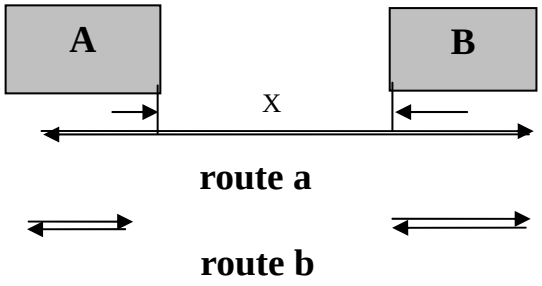
- **Vector sorting —** When your image has one vector cut area enclosing another vector cut area, this setting will automatically direct the laser to cut out the inside enclosure before moving to the outside image.
- **Optimization –** This is another setting that will automatically cut down on operation time. When selected, the EXPLORER driver will analyze your image and find the most efficient passing route to complete the job.

C-5 Cluster

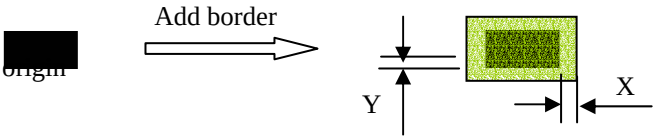
To reduce the working time needed for multiple productions, this setting may be used. Let’s take multiple stamp production for example. When selected, the driver will automatically determine the fastest method to engrave more than one stamps. The laser may complete one stamp before starting another or may undertake several stamps at the same time. Adjust

the Distance setting to determine the maximum distance the laser can “leap-frog” from one image to another.

As below, suppose the “Distance” you specified is D and the distance between graph A & B is X. If you chose the function “Cluster” and X > D, the output movement will be route b. If you don’t chose “Cluster” or even you chose “Cluster” and X ≤ D, the output movement will be route a.



C-6 Border
You can add border at image edge for a better output of the stamp image. You must select “Image Invert” under stamp mode when using border. As for the figure below, you can specify the border X and Y. If you chose the “Cluster” and want to have border, the border X and Y must be less than the “Distance” D you specified.

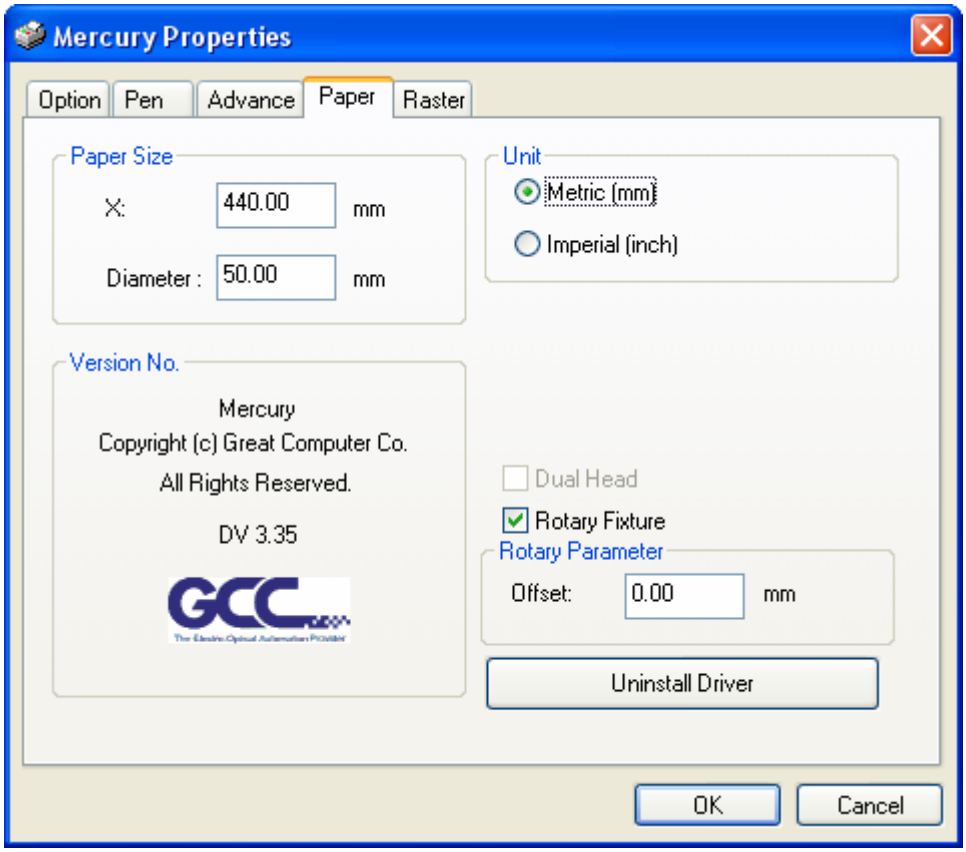


D. Paper Settings

These settings are included in Mercury driver Properties → Paper. They are used to adjust several output settings.

D-1 Paper Size
As described in Paper and Layout Settings, ensure that the paper size is no greater than the working table area.

D-2 Unit
You can choose the unit measurement either with metric or imperial inch.



D-3 Rotary Attachment

Rotary attachment is specially designed for engraving on the surface of round objects or cylinders. Please check the chapter of rotary attachment installation in **chapter I INTRODUCTION**.

- **Diameter:** Set up the diameter of the engraving area.
  Circumference = Diameter x 3.14159
- **Offset:** The distance from the open end of the engraving object to the base of the padded rubber disk. The offset value will be displayed on the LCD screen.

D-4 Dual Head

When working with **Dual Head**, the function of **Rotary Fixture** is disabled and vice versa. The working size for dual head is 305mm x 458mm, while enable the rotary fixture the working size will change into 635mm x 458mm.

VI. BASIC MAINTENANCE

Caution:

- Keeping the optics and motion system clean is essential to an excellent quality engraving and the reliability of your engraver. **Please clean Bearing track and X-axis (DU) bearing daily to maintain good condition of machine.**
- Never pour or spray any liquid directly onto the laser system.
- Turn off the power and unplug the system before cleaning.

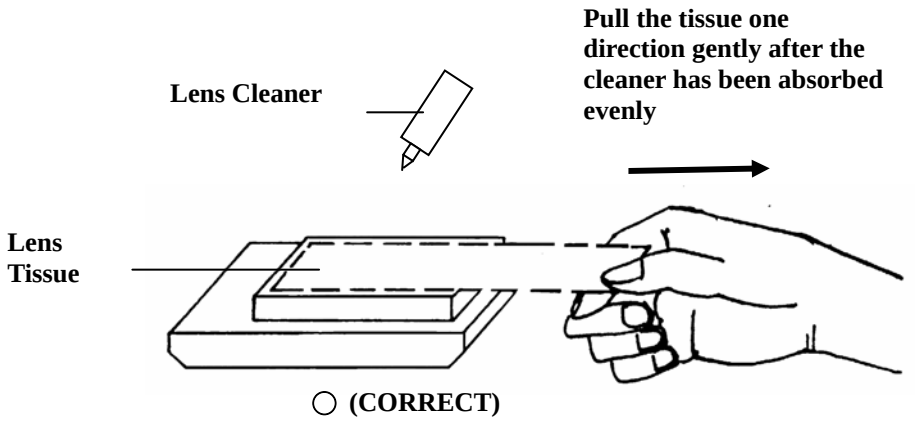
1. **Inside the System:** Open the top door, the front door and the back door (if necessary). Vacuum to clean inside of the engraver and vent area thoroughly.
2. **Engraving Table:** Dampen the paper towel or cloth with alcohol or cleaner to clean the Engraving Table.
3. **Motion System:** Dampen the cotton swab to clean the rails of the Motion System. Get rid off any debris built up in the bearing tracks.
4. **Bearings:** Hold a dampened cotton swab against the bearing and moving the motion system by hand to clean each bearing.
5. **Mirrors and Lens:** The focus lens and the mirror located on the carriage are the two components most likely to require frequent cleaning.

Caution:

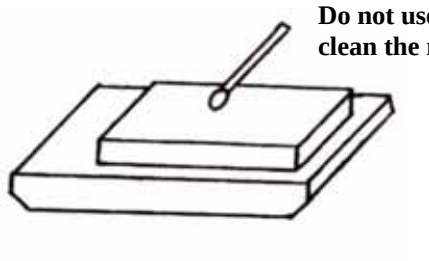
Don't scratch out the soft coating of the mirror's surface. Excessive cleaning the mirrors and lens may cause damage and reduce their life cycle (refer to Fig. 24).

Clean the mirror – Please refer to the figure as below

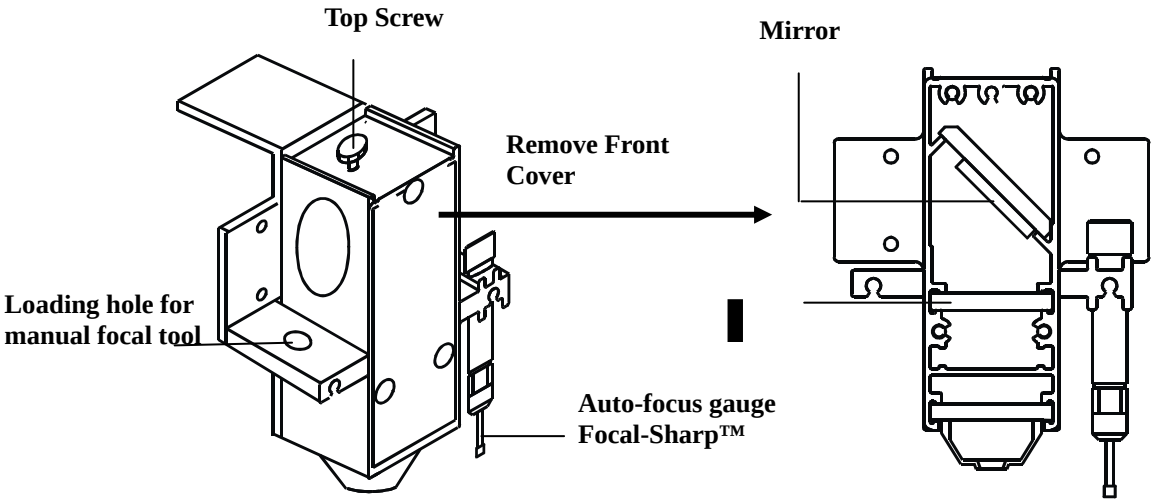
1. Unscrew and remove front cover of the focus carriage. Release the top screw and pull out mirror carefully.
2. Put lens tissue on the mirror and drop a little lens cleaner on the middle area of the tissu, after the fluid has been absorbed evenly, pull the tissue **one direction** gently to clean the mirror.
3. Let it air dry and re-install it.
4. Unscrew and remove the dust prevention box then clean the X-axis Mirror, Y-axis Mirror and #1 mirror same as above process separately.



○ (CORRECT)



× (INCORRECT)



Clean the focus lens –

1. Unscrew and remove the front cover of the focus carriage. Pull out focus lens carefully.
2. Flood the focus lens with lens cleanser on both sides then using a cotton swab or lens tissue to dry off the remaining solution gently.
3. Do not touch the lens surface with your bare hands or press down hard with any cleaning material.

VII. TROUBLE SHOOTING

Quality Problems

- Check focus length set under the function key to see if it matches the type of the lens installed.
- Focus Lens is not installed correctly. Focus Lens is loose in the holder.
- Debris or dust builds up in the bearing tracks or X-Axis rails.
- The focus lens and the mirror in the carriage are damaged or need to be clean.

Non-operational Problems

- **Laser beam does not generate.**
  1. If the red alignment beam is not revealed, the laser beam is misalignment. Adjust reflection mirrors for exact focus.
  2. If the red alignment beam is revealed, please check the driver power. The laser power may be too low to be detected. Please increase the percentage setting of the Laser Power from the software driver or the control panel.
  3. Please check if the laser power connector is loose.
  4. For safety purpose, the laser beam will not be generated when the top or front door is opened unless you short the connector of the magnetic switches.

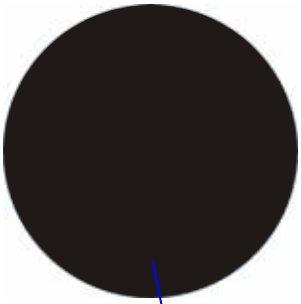
Appendix A. 3D Function

Tip for 3D Application

When doing 3D sample on LaserPro Mercury (L-25), acrylic or MDF wood are ideal materials for the purpose. For acrylic the suggested PWR is 100%, SPD around 30%(depends on how deep you want to cut).

The perfect image for 3D is like those shown below. When image is ready, choose 3D Effect as the output mode in the driver. Sometimes, some material shows better effect if you run the job with 2nd pass with laser out-of-focus. Especially with acrylic, the 2nd pass will smooth out the surface.

For engraving wood, as it burns easily and leaves blackened surface after the 1st pass, it is necessary to run the 2nd pass to remove the burned surface. To do that, simply fill the image with black colour as the mask (see below) and Run the black mask image with PWR 100% and SPD100%.



Create a black image for polishing

3D engraving / Material: 1cm Acrylic by Mercury 25W Lens: 2 inch

Step	Speed	Power	DPI	PPI	Focus	Remarks
1	25%	100%	600	auto	Auto Focus	3D Mode Engraving
2	25%	100%	600	auto	Lower down table 2.5mm	3D Mode Engraving
3	100%	100%	600	800	Lower table again 2 mm	Black and White Mode Polishing
4	0.2%	100%	500	auto	Move table up 1.3mm	Cutting off

APPENDIX B. Application Parameters

Engraving Parameter

Material	LaserPro	Power%	Speed%
Acrylic	L-12	100	100
	L-25	50	100
	L-50	25	100
Laminated Acrylic	L-12	80	100
	L-25	40	100
	L-50	20	100
Immitation Leather	L-12	100	100
	L-25	50	100
	L-50	25	100
Leather	L-12	60	100
	L-25	30	100
	L-50	15	100
Mat Board	L-12	100	50
	L-25	100	100
	L-50	50	100
Padauk	L-12	100	30
	L-25	100	60
	L-50	85	100
Sign Vinyl	L-12	50	100
	L-25	25	100
	L-50	12	100
Rubber	L-12	100	8
	L-25	100	15
	L-50	100	30
Brass Coated	L-12	100	100
	L-25	50	100
	L-50	25	100
Glass	L-12	100	30
	L-25	100	60
	L-50	85	100
Crystal	L-12	100	30
	L-25	100	60
	L-50	85	100
Poly buttons	L-12	100	30
	L-25	100	60
	L-50	85	100
Marble	L-12	100	30
	L-25	100	60
	L-50	85	100
Ceramics	L-12	100	50
	L-25	100	100
	L-50	50	100

Cutting Parameters

Material		LaserPro	Power%	Speed%
Acrylic	2mm	L-12	100	1
		L-25	100	2
		L-50	100	4
	3mm	L-12	100	0.4
		L-25	100	1
		L-50	100	2
	4mm	L-12	100	0.4
		L-25	100	0.8
		L-50	100	1
	5mm	L-12	100	0.2
		L-25	100	0.4
		L-50	100	1
	8mm	L-25	100	0.2
		L-50	100	0.4
	12mm	L-25	100	0.2
		L-50	100	0.4
Rubber	2.5mm	L-12	100	0.4
		L-25	100	1
		L-50	100	2
Backlite	1mm	L-12	100	0.2
		L-25	100	0.4
		L-50	100	1
Plywood	3mm	L-12	100	1
		L-25	100	2
		L-50	100	4
	4mm	L-12	100	0.4
		L-25	100	0.8
		L-50	100	2
	5mm	L-12	100	0.2
		L-25	100	0.4
		L-50	100	0.8

Be noticed that above parameters are for reference only. Various kinds of elements, structures and component ratios may affect the engraving and cutting results differently.

APPENDIX C. Specification

MERCURY	L-12	L-25	L-40
Laser Source	12W	25W	40W
	Air Cooled, Sealed CO_2 laser		
Work Area	25” × 18” (635mm × 458mm)		
Max. Working Piece (all doors closed)	31.5” × 22.4” × 6.5” (800mm × 570mm × 165mm)		
Max. Working Piece (all doors open)	26.8”× ∞ × 6.5” (680mm × ∞ × 165mm)		
Table Size	31” × 20.9” (790mm × 530mm)		
Overall Dimensions	44.3” × 28.3” × 39.6” (1125mm × 720mm × 1005mm)		
Drive	DC servo control		
Speed Control	Adjustable from 0.1% to 100% of 42 inch/sec with up to 16 colors linked speed setting per job		
Power Control	Adjustable from 0.1%～100% and 16 colors linked power setting per job		
Z Axis Moving	Automatic		
Resolution (DPI)	200, 250, 300, 500, 600, 1000		
Computer Interface	Print port and serial port for PC		
Memory Buffer	16MB standard and upgrade to 64 MB with SIMM modules. Multiple file mode saves up to 100 files.		
Display Panel	4-line LCD display showing current file name, total working time. Laser power, engraving speed, file loaded into memory buffer, setup and diagnostic menus.		
Power	100～240V, AC Auto Switch		
Power Consumption	700W	880W	2000W

Above specification is subject to change without notice.

Optional Items:

- Rotary Attachment
- Dual Head
- Honeycomb Table
- Cutting box
- SmartAIR Fine/ Ultra Nozzle
- Air Extraction System
- Air Assist System